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# THE MEDICAL JOURNAL OF AUSTRALIA.

VOL. I.—5TH YEAR. SYDNEY: SATURDAY, MAY 11, 1918. No. 19.

## AGGLUTINATION AFTER THE ADMINISTRATION OF TYPHOID AND PARA-TYPHOID VACCINES.[1]

A Thesis presented for the degree of Doctor of Medicine.

By **William Keith Inglis, M.B., Ch.M.,**

*Captain, Australian Army Medical Corps, Australian Imperial Force, and Demonstrator in Pathology, University of Sydney.*

(*Continued from page* 366.)

### Table IV.

The doses are the same as in Table II., but the interval between the doses is different. The same vaccine and test emulsion were used. In five individuals (45, 46, 50, 51, 53) fifteen days or more elapsed after the first injection before the second was administered. In these cases the titre on the tenth and fifteenth days were measured. In four out of five the agglutination titre had attained its maximum by the tenth day. In one (51) it had not.

No. 44 is interesting. This was a doctor who had been inoculated, as indicated, in February, 1915. He gave a positive reaction before the first injection and yet his agglutinin response is the lowest in the series. This will be referred to later.

No. 51 after a single injection of 500 million showed the highest titre met with so far. The test was repeated three times, each time with the same

**Table IV. B. typhosus vaccine II. B. typhosus emulsion II.**

| No. | Age in Years. | Weight in lbs. | Date. | Agglutination. | Dose in Millions. | Date. | Agglutination. | Dose in Millions. | Date. | Agglutination. | Dose in Millions. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 | 23 | 182 | 26.4.'16 | + 1 in 10 90 secs. | 500 | 3.5.'16 | + 1 in 200 110 secs. | 1,000 | 11.5.'16 | + 1 in 200 50 secs. | Nil. |
| 45 | 23 | 160 | 27.4.'16 | — | 500 | 7.5.'16 | + 1 in 1,000 120 secs. (trace). | Nil. | 12.5.'16 | + 1 in 1,000 80 secs. | Nil. |
| 46 | 24 | 116 | 27.4.'16 | — | 500 | 7.5.'16 | + 1 in 1,000 70 secs. | Nil. | 12.5.'16 | + 1 in 500 70 secs. | 1,000 |
| 47 | 18 | 161 | 27.4.'16 | — | 500 | 5.5.'16 | + 1 in 500 70 secs. | 1,000 | 12.5.'16 | + 1 in 1,000 50 secs. | Nil. |
| 48 | 36 | 128 | 27.4.'16 | — | 500 | 5.5.'16 | + 1 in 500 90 secs. | 1,000 | 12.5.'16 | + 1 in 2,000 120 secs. | Nil. |
| 49 | 28 | 147 | 27.4.'16 | — | 500 | 5.5.'16 | + 1 in 2,000 120 secs. (trace). | 1,000 | 12.5.'16 | + 1 in 2,000 60 secs. | Nil. |
| 50 | 32 | 144 | 27.4.'16 | — | 500 | 7.5.'16 | + 1 in 500 120 secs. (trace). | Nil. | 12.5.'16 | + 1 in 200 80 secs. | 1,000 |
| 51 | 23 | 182 | 27.4.'16 | — | 500 | 7.5.'16 | + 1 in 2,000 70 secs. | Nil. | 12.5.'16 | + 1 in 5,000 70 secs. | 1,000 |
| 52 | 21 | 136 | 27.4.'16 | — | 500 | 5.5.'16 | + 1 in 500 70 secs. | 1,000 | 12.5.'16 | + 1 in 1,000 75 secs. | Nil. |
| 53 | 22 | 160 | 27.4.'16 | — | 500 | 7.5.'16 | + 1 in 1,000 120 secs. (trace). | Nil. | 12.5.'16 | + 1 in 1,000 85 secs. | 1,000 |

44. Was a doctor. He was inoculated against typhoid fever in February, 1915, at Royal Prince Alfred Hospital, Sydney. He received 125, 250 and 500 million doses at intervals of seven days.
50. states that he had three months' tuberculin treatment for pulmonary tuberculosis seven years ago.

**Table V.—B. typhosus vaccine II. B. typhosus emulsion II.**

| Number | Age in Years. | Weight in Pounds. | Date. | Agglutination. | Dose in Millions | Date. | Agglutination | Dose in Millions | Date. | Agglutination. | Dose in Millions | Date. | Agglutination. | Dose in Millions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 54 | 38 | 189 | 22.5.'16 | — | 750 | 29.5.'16 | + 1 in 500 120 secs. (trace) | 1,250 | 6.6.'16 | + 1 in 2,000 100 secs. | Nil | 14.6.'16 | + 1 in 1,000 80 secs. | Nil |
| 55 | 26 | 176 | 22.5.'16 | — | 750 | 29.5.'16 | + 1 in 2,000 70 secs. | 1,250 | 6.6.'16 | + 1 in 5,000 70 secs. | Nil | 14.6.'16 | + 1 in 5,000 70 secs. | Nil |
| 56 | 31 | 161 | 22.5.'16 | — | 750 | 29,5,'16 | + 1 in 500 90 secs. | 1,250 | Left Camp | — | — | — | — | — |
| 57 | 26 | 154 | 22.5.'16 | — | 750 | 29.5.'16 | + 1 in 1,000 105 secs. | 1,250 | 6.6.'16 | + 1 in 2,000 45 secs. | Nil | 14.6.'16 | + 1 in 5,000 100 secs. | Nil |
| 58 | 27 | 146 | 22.5.'16 | — | 500 | 29.5.'16 | + 1 in 500 70 secs. | 1,000 | 6.6.'16 | + 1 in 2,000 60 secs. | Nil | 14.6.'16 | + 1 in 2,000 60 secs. | Nil |
| 59 | 26 | 150 | 22.5.'16 | — | 250 | 29.5.'16 | + 1 in 20 50 secs. | 500 | 6.6.'16 | + 1 in 2,000 120 secs. (trace) | 1,000 | 14.6.'16 | + 1 in 5,000 60 secs. | Nil |
| 60 | 21 | 160 | 22.5.'16 | — | 250 | 29.5.'16 | + 1 in 500 100 secs. | 500 | 6.6.'16 | + 1 in 5,000 90 secs. | 1,000 | 14.6.'16 | + 1 in 5,000 60 secs. | Nil |
| 61 | 25 | 163 | 22.5.'16 | — | 250 | 29.5.'16 | — | 500 | 6.6.'16 | + 1 in 500 110 secs. | 1,000 | 14.6.'16 | + 1 in 500 110 secs. | Nil |
| 62 | 19 | 154 | 22.5.'16 | — | 250 | 29.5.'16 | + 1 in 50 105 secs. | 500 | 6.6.'16 | + 1 in 2,000 70 secs. | 1,000 | 14.6.'16 | + 1 in 2,000 70 secs. | Nil |

result. This is further evidence suggesting that it is the first dose that is mainly responsible for the production of agglutinins.

**Table V.**

Still larger doses of vaccine were given, the vaccine and test emulsion being the same as in Tables III. and IV.

The larger doses did not seem to affect the men seriously, though big men, it is true, were chosen.

The agglutinin response seemed more marked at first after 750 million or 500 million than it did after 250 million, but subsequent injections prevented detailed comparison of the effects produced by these doses being made.

The results after the three different methods of dosage did not show any appreciable difference when the last tests were made, but unfortunately these cases were kept under observation only for a very short time.

**Table VI.**

In this series, unless otherwise noted, all injections were made, and all specimens of blood taken, approximately at noon.

These men were all members of the Army Medical Corps staff.

It is interesting to note that no agglutinins appeared in any case until the sixth day, when every case showed them. Those who received only 250 million organisms at the first injection showed less agglutinins in the early stages than those who received 500 million.

On the seventh day in every case the agglutinins had greatly increased, but the men who received the smaller doses still lagged behind.

On this day the second inoculation was given, and five hours later the agglutinins had risen markedly in every instance.

On the eighth day, *i.e.*, twenty-four hours after the second injection, the titre in every case was still higher. Up to this point the men who received the smaller doses continued to lag behind.

No evidence of a negative phase was seen.

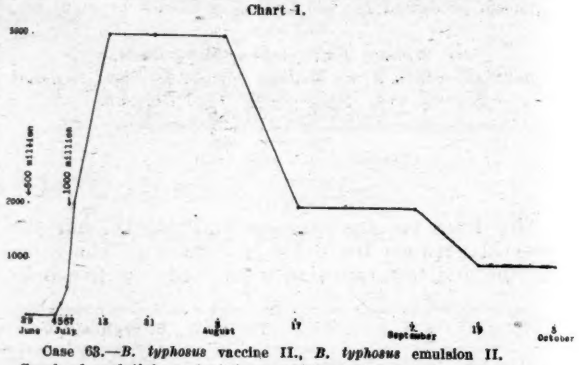
The maximum titre was attained between the eighth and fourteenth days in all cases, except Case 67, who, by an oversight, was not tested on the fourteenth day, though he received a third injection of 1,000 million. On the following day, however, he had reached his maximum. Whether the third injection helped to raise the titre of his serum or not is doubtful.

In No. 66 the titre fell considerably fourteen days after the second injection, *i.e.*, twenty-one days after the first injection; in all the others comparatively high titres were maintained over longer periods. The rate of fall varied in different cases, but in every instance became progressively slower with the lapse of time.

Three individuals were kept under prolonged observation, Nos. 63, 65 and 67, and the results are indicated graphically in Charts I., II. and III. The agglutinin content fell most in Case 67, though he was the only one to receive three injections.

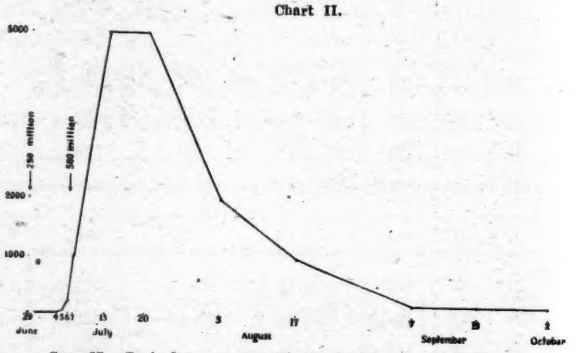
In almost every instance where typhoid agglutinins were tested in this series, paratyphoid A and B agglutinins were also sought for. As the results were invariably negative, they have not been recorded in the table.

Chart I.



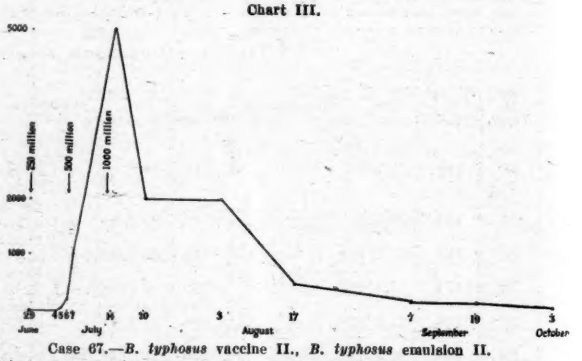

Case 63.—*B. typhosus* vaccine II., *B. typhosus* emulsion II.
Graph of agglutinin content for a period of three months after two injections of typhoid vaccine.

Chart II.




Case 65.—*B. typhosus* vaccine II., *B. typhosus* emulsion II.
Graph of agglutinin content of the blood serum over a period of three months after two injections of typhoid vaccine.

Chart III.




Case 67.—*B. typhosus* vaccine II., *B. typhosus* emulsion II.
Graph of agglutinin content of the blood serum for about three months after three injections of typhoid vaccine.

**Graphic Representation of the Curve of Agglutination.**

The curve of agglutination is probably regular and continuous, not a zig-zag line, as represented in some of the charts.

**Table VI.—B. typhosus vaccine II. B. typhosus emulsion II.**

| Number. | Age in Years. | Weight in Pounds. | Date. | Agglutination. | Dose in Millions | Date. | Agglutination. | Dose in Millions | Date. | Agglutination. | Dose in Millions | Date. | Agglutination. | Dose in Millions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 63 | 24 | 175 | 29.6.'16 | — | 500 | 4.7.'16 | — | Nil | 5.7.'16 | + 1 in 200 120 secs. (trace) | Nil | 6.7.'16 Noon | + 1 in 500 70 secs. | 1,000 |
| 64 | 21 | 140 | 29.6.'16 | — | 500 | 4.7.'16 | — | Nil | 5.7.'16 | + 1 in 100 120 secs. (trace) | Nil | 6.7.'16 Noon | + 1 in 500 90 secs. | 1,000 |
| 65 | 32 | 142 | 29.6.'16 | — | 250 | 4.7.'16 | — | Nil | 5.7.'16 | + 1 in 20 80 secs. | Nil | 6.7.'16 Noon | + 1 in 200 120 secs. (trace) | 500 |
| 66 | 31 | 196 | 29.6.'16 | — | 250 | 4.7.'16 | — | Nil | 5.7.'16 | + 1 in 20 120 secs. (trace) | Nil | 6.7.'16 Noon | + 1 in 200 60 secs. | 500 |
| 67 | 22 | 161 | 29.6.'16 | — | 250 | 4.7.'16 | — | Nil | 5.7.'16 | + 1 in 50 70 secs. | Nil | 6.7.'16 Noon | + 1 in 200 120 secs. (trace) | 500 |

**Table VI.—B. typhosus vaccine II. B. typhosus emulsion II.** (*Continued*).

| Number | Date. | Agglutination. | Dose in Millions | Date. | Agglutination. | Dose in Millions | Date. | Agglutination. | Dose in Millions | Date. | Agglutination. | Dose in Millions | Date. | Agglutination. | Dose in Millions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 63 | 6.7.'16 5 p.m. | + 1 in 1,000 70 secs. | Nil | 7.7.'16 Noon | + 1 in 2,000 70 secs. | Nil | 13.7.'16 | + 1 in 5,000 120 secs. (trace) | Nil | — | — | — | 21.7.'16 | + 1 in 5,000 70 secs. | Nil |
| 64 | 6.7.'16 5 p.m. | + 1 in 1,000 60 secs. | Nil | 7.7.'16 Noon | + 1 in 2,000 45 secs. | Nil | 13.7.'16 | + 1 in 5,000 90 secs. | Nil | — | — | — | 20.7.'16 | + 1 in 5,000 60 secs. | Nil |
| 65 | 6.7.'16 5 p.m. | + 1 in 500 90 secs. | Nil | 7.7.'16 Noon | + 1 in 1,000 80 secs. | Nil | 13.7.'16 | + 1 in 5,000 120 secs. (trace) | Nil | — | — | — | 20.7.'16 | + 1 in 5,000 90 secs. | Nil |
| 66 | 6.7.'16 5 p.m. | + 1 in 500 100 secs. | Nil | 7.7.'16 Noon | + 1 in 1,000 90 secs. | Nil | 13.7.'16 | + 1 in 2,000 60 secs. | Nil | — | — | — | 20.7.'16 | + 1 in 500 70 secs. | Nil |
| 67 | 6.7.'16 5 p.m. | + 1 in 500 120 secs. (trace) | Nil | 7.7.'16 Noon | + 1 in 1,000 110 secs. | Nil | 13.7.'16 | Not Done | 1,000 | 14.7.'16 | + 1 in 5,000 90 secs. | Nil | 20.7.'16 | + 1 in 2,000 90 secs. | Nil |

**Table VI.—B. typhosus vaccine II. B. typhosus emulsion II.** (*Continued*).

| Number | Date. | Agglutination. | Dose in Millions | Date. | Agglutination. | Dose in Millions | Date. | Agglutination. | Dose in Millions | Date. | Agglutination. | Dose in Millions | Date. | Agglutination. | Dose in Millions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 63 | 3.8.'16 | + 1 in 5,000 110 secs. | Nil | 17.8.'16 | + 1 in 2,000 70 secs. | Nil | 7.9.'16 | + 1 in 2,000 70 secs. | Nil | 19.9.'16 | + 1 in 1,000 70 secs. | Nil | 3.10.'16 | + 1 in 1,000 60 secs. | Nil |
| 64 | 3.8.'16 | + 1 in 2,000 60 secs. | Nil | Left Camp | — | — | — | — | — | — | — | — | — | — | — |
| 65 | 3.8.'16 | + 1 in 2,000 80 secs. | Nil | 17.8.'16 | + 1 in 1,000 120 secs. | Nil | 7.9.'16 | + 1 in 200 60 secs. | Nil | 19.9.'16 | + 1 in 200 80 secs. | Nil | 2.10.'16 | + 1 in 200 70 secs. | Nil |
| 66 | Left Camp | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 67 | 3.8.'16 | + 1 in 2,000 110 secs. | Nil | 17.8.'16 | + 1 in 500 70 secs. | Nil | 7.9.'16 | + 1 in 200 70 secs. | Nil | 19.9.'16 | + 1 in 200 110 secs. | Nil | 3.10.'16 | + 1 in 100 80 secs. | Nil |

No. 65 states that he was inoculated against typhoid fever sixteen years ago.

Owing to the long intervals between the tests, and the employment of definite standard dilutions, this irregularity is unavoidable.

It must be realized that when a serum is recorded as clumping in, say, a dilution of 1 in 1,000, this merely indicates that the end point lies somewhere between 1 in 1,000 and 1 in 2,000. Even though this particular serum would agglutinate in a dilution of 1 in 1,900 it would be recorded in the chart as agglutinating in a 1 in 1,000 dilution.

In these graphic charts, no attention is paid to the time taken in the tests.

### Table VII.

The same vaccine and test emulsion were used as in Table VI.

No. 71 gave a positive result at the start. This can hardly be attributed to his previous inoculation, as the interval was too long.

Seven days after the first inoculation these cases had reacted feebly. Ten days after the second injection the only two that remained under observation showed fairly high agglutination titres.

### Table VIII.

Several of the results in Table VII. were obtained by testing the serum sixteen days after it was collected. As these results were slightly different from what was anticipated, it was decided to test specimens of the same blood after they had been kept at room temperature for varying periods of time. The tests were carried out during the months of August, September and October, in comparatively cool weather. The results obtained are recorded in this table.

After seven to ten days the blood began to hæmolyse to a certain extent, but the agglutination titre did not diminish throughout the period of investigation (55 days).

The agglutinins apparently are stable bodies and retain their clumping power for a long time *in vitro*, without any more than the routine precautions for sterile collection and storage at room temperature.

It is interesting to note that in No. 70, who only received doses of 250 and 500 million, the titre remained higher than in No. 68, who received double these doses, though when the last tests were made the difference between the two was only slight. The con-

**Table VII.—B. typhosus vaccine II. B. typhosus emulsion II.**

| Number. | Age in Years. | Weight in Pounds. | Date. | Agglutination | Dose in Millions | Date. | Agglutination | Dose in Millions | Date. | Agglutination | Dose in Millions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 68 | 42 | 147 | 13.7.'16 | — | 500 | 20.7.'16 | + 1 in 50 60 secs. | 1,000 | 3.8.'16 | + 1 in 500 90 secs. | Nil |
| 69 | 23 | 161 | 13.7.'16 | — | 500 | Left Camp | — | — | — | — | — |
| 70 | 19 | 140 | 13.7.'16 | — | 250 | 20.7.'16 | + 1 in 20 60 secs. | 500 | 3.8.'16 | + 1 in 1,000 100 secs. | Nil |
| 71 | 31 | 143 | 13.7.'16 | + 1 in 20 120 secs. (trace) | 250 | 20.7.'16 | + 1 in 50 60 secs. | 500 | — | — | — |

**Table VII.—B. typhosus vaccine II. B. typhosus emulsion II. (*Continued*).**

| Number | Date. | Agglutination | Dose in Millions | Date. | Agglutination | Dose in Millions | Date. | Agglutination | Dose in Millions | Date. | Agglutination | Dose in Millions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 68 | 17.8.'16 | + 1 in 200 50 secs. | Nil | 7.9.'16 | + 1 in 200 90 secs. | Nil | 19.9.'16 | + 1 in 100 70 secs. | Nil | 3.10.'16 | + 1 in 100 60 secs. | Nil |
| 70 | 17.8.'16 | + 1 in 500 120 secs. | Nil | — | — | — | 19.9.'16 | + 1 in 200 120 secs. | Nil | 2.10.'16 | + 1 in 100 120 secs. | Nil |

No. 71 left camp 20.7.'16. He states that he was inoculated against typhoid fever eight years ago.

**Table VIII.—B. typhosus vaccine II. B. typhosus emulsion II.**

| Number. | Age in Years. | Weight in Pounds. | Date. | Agglutination. | Date. | Agglutination. | Date. | Agglutination. | Date. | Agglutination. |
|---|---|---|---|---|---|---|---|---|---|---|
| 63 | 24 | 175 | 17.8.'16 | + 1 in 2,000 90 secs. | 13.9.'16 | + 1 in 2,000 70 secs. | 25.9.'16 | + 1 in 2,000 60 secs. | 11.10.'16 | + 1 in 2,000 60 secs. |
| 65 | 32 | 142 | 17.8.'16 | + 1 in 1,000 120 secs. (trace) | 13.9.'16 | + 1 in 1,000 120 secs. (trace) | 25.9.'16 | + 1 in 1,000 100 secs. | — | — |

No. 63 inoculated 29.6.'16 (500) and 6.7.'16 (1000). No. 65 inoculated 29.6.'16 (250) and 6.7.'16 (500).
All the specimens of blood were collected on 17.8.'16, and tested at varying periods, as tabulated above.

trast presented by the agglutinin response in these two cases is probably due to their difference in susceptibility. If No. 70 had received doses of 500 and 1,000 million his agglutination titre would probably have been even higher than it was.

*(To be Continued.)*

## THE PRACTICE OF ANÆSTHETICS*

(A Condensed Lecture, from which the Physio-pathology of anæsthetics has been deleted.)

By **E. H. Embley, M.D.,**
*Consulting Anaesthetist to the Melbourne Hospital*

*(Continued from page 370.)*

*Rectal Etherization.*—By this method the surgeon and the anæsthetist attend their respective parts without hindrance, as in mouth, head, or throat operations. The usual preparation is carried out, but in addition, the bowels are washed out by an enema, about two hours before the operation starts. Pre-anæsthetic narcosis is necessary. A mixture of 75 parts ether and 25 of olive oil is injected by means of a funnel and a rectal tube or soft catheter with a short length of rubber tube attached. The soft rubber catheter or rectal tube is passed 8 to 10 centimetres into the rectum. Two hundred cubic centimetres of the oil-ether mixture are used for adults and the same quantity of 50% concentration is used for youths. It should all be run in within about five minutes. The rectal tube is not removed until the patient is partly unconscious. From five to twenty minutes are required for anæsthesia to be induced. Proctitis is more apt to ensue if the 75% concentration is exceeded. The same guidance is used as for inhalation methods, but a lighter degree of anæsthesia is employed, so that if the conjunctival reflex is lost or slight cyanosis sets in, the narcosis is considered to be too deep, and then 60 or 70 c.cm. of the oil ether are drawn off by means of the small rectal tube. Recovery is effected by washing out the oil-ether that remains. This is done by inserting two small rectal tubes as far up as possible into the bowel and connecting one with a douch of soapy water. The more thoroughly this is done the more rapid will be the recovery. After this, 60 to 120 c.cm. of plain olive oil should be injected and the tubes withdrawn.

The disadvantages attending this method are the clumsy control, and that it is not as safe as the inhalational methods.

*The Intra-Tracheal Method.*—The air-ether mixture is, by this method, driven directly into the bronchi, thereby rendering the patient independent of his own respiratory movements. The expiration is replaced by the back current which passes out between the tracheal wall and the catheter, carrying with it the surplus and the $CO_2$. The apparatus by which this is effected, is a small blower driven usually by a small electro-motor. The air current thus produced passes through warming tubes and over a large surface of ether, and thence by tubes to the catheter, which is passed through the glottis nearly to the bifurcation of the bronchi. The pressure at which the air is driven in is usually equal to 25 mm. Hg.. This is generally sufficient to overcome the resiliency of the lungs and so to prevent their collapse when the pleural cavity is opened. The level of anæsthesia is regulated by a tap, which admits of more or less of the air being driven over ether. The tap carries an index for more accurate adjustment. The pressure is controlled by taps and a mercury valve. The catheter should not exceed in diameter half that of the glottis, a number 24 French being about adult size. It should carry a mark denoting the depth to which the catheter should be pushed down; the mark should come opposite the incisor teeth.

After deep anæsthesia has been induced by ether in the usual way, the catheter is passed either by direct vision, using Jackson's electrically-illuminated speculum, or by guiding it into the glottis by means of two fingers which, at the same time, hold up the epiglottis. The introduction of the catheter is the principal obstacle to the use of the method. For this the patient must be sufficiently deeply anæsthetized to eliminate reflex closure of the glottis, which otherwise occurs directly the epiglottis is touched with the finger. The intra-thoracic pressure induced is apt to lead up to banking of venous blood on the right side of the heart, as indicated by distention of the neck veins. When this occurs, the pressure of the delivery can be reduced to nearly minimum for brief periods, from time to time.

The method is intended for intra-thoracic operations.

*Intra-Pharyngeal Administration of Ether.*—This is accomplished by means of the same aparatus as that used in the intra-tracheal method, except that the tracheal catheter is replaced by two soft rubber catheters passed through the nostrils as far as the pharynx. The two catheters are joined at the proximal ends by a metal Y piece connected with the delivery tube of the apparatus. The ether-air mixture is delivered in quantity for all requirements into the pharynx. The level of the anæsthesia is regulated by taps in the same manner as in the intra-tracheal method. It is used for mouth and throat operations.

### Nitrous Oxide and Oxygen Supplemented with Ether.

This method has rapidly grown in popularity in America owing to the opinion held there that shock is lessened in operations performed in the narcosis so induced, and owing to the rapidity of recovery and freedom from unpleasant after effects. The anæsthesia induced is not so satisfactory from a surgical point of view as that by ether; no true muscular relaxation, for instance, is obtained, and the corneal reflex is rarely abolished. It is not as safe, according to some American reports, as ether is.

Pre-narcosis is necessary. The most common form of apparatus is the Clover inhaler with a three-way stop-cock for either to and fro breathing into the bag, or continuous inspiration from the bag and open expiration, or for air breathing. At the distal end of the bag a three-way tube is attached, one way going to the oxygen and the other to the nitrous oxide.

The administration is conducted in the same way as with nitrous oxide, oxygen being let in when signs of cyanosis appear. Ether is supplementary,

to complete the anæsthesia in refractory cases or to endeavour to secure better relaxation when required. Where the $N_2O$ is cheap, that is, made on the premises, the gas is used with the expiration valve open; but where gas in compressed state is used, it is conserved by rebreathing. In the latter case it is necessary to open the expiration valve whenever the breathing becomes too vigorous, in order to permit escape of the retained $CO_2$.

It is considered a safer method for operations upon diabetics, but it is largely used in parts of America as the routine agent.

#### Mixtures of Chloroform with Ether, etc.

Mixtures of chloroform and ether in various proportions are used a good deal in Europe. They are safer than chloroform alone, owing to the dilution. The ether in the quantity used carries no advantage other than that of diluent.

The A.C.E. mixture, that is, a mixture of alcohol 1, chloroform 2, and ether 3 parts, is used where, for any reason, open ether cannot be used. It is given on the ordinary flannel mask when pre-narcosis is used, but it needs a much larger evaporizing surface, such as a Silk's mask, when pre-narcosis is not employed. The same precautions as when ether is employed must be used against saliva entering the larynx, when used without pre-narcosis. The same guides are used as for chloroform, and it must be regarded as diluted chloroform. It is a safer agent than chloroform, owing to this dilution.

#### The Advantages Of Ether.

As an anæsthetic agent the advantages possessed by ether over those of chloroform are that, in anæsthetic quantities, it is $^1/_{52}$ as toxic to the heart as chloroform; it is a more effective obtundant of afferent impulses than chloroform, so, after operations in the narcosis of ether, less shock is incurred; respiration is very much more efficient, being a high maximum, whereas with chloroform it is minimal or even subminimal; anæsthesia is more perfect for equal degrees of narcosis, and blood pressure is more effectively sustained, especially when ether is given by the closed method. When used without pre-anæsthetic narcosis, its greatest drawback is the salivation which is not only apt to enter the larynx and obstruct breathing by causing laryngeal spasm, but when inspired into the lung is prone to be the cause of pneumonia. These troubles are, in nearly all cases, eliminated by pre-narcosis or by the use of the saliva aspirator. Ether cannot well be used in cases of phthisis or bronchitis without the risk of aggravating these conditions.

*Overdosage of ether.*—Sudden cessation or gradual shallowing or slowing of the respiration, when accompanied by widely dilated pupils, indicates overdose. This occurs before the blood pressure is materially lowered. Inhibition of the respiration, due to reflexes arising from the larynx, as, for instance, when saliva has trickled into it, can be distinguished from respiratory failure by the small pupils of the former.

*Treatment of Overdose.*—The face piece should be removed and artificial respiration commenced. This promptly restores natural breathing.

*Ether and Oxygen.*—This is the safest of all methods of effecting anæsthesia. It should be one of the chief methods of election for all shocked or exhausted patients. It is also the method chosen when respiration is embarrassed and other methods are dangerous. Unnecessary strain should not be put upon the respiration in such cases, and therefore the $CO_2$ accumulation should be let off frequently. It is best effected by means of the Clover inhaler, to the distal end of the bag of which the oxygen cylinder has been connected by means of a rubber tube. The ether is given in the ordinary way, but in bad cases without ethyl chloride. Oxygen is used to fill the bag instead of air.

#### The Value of Pre-Anæsthetic Narcosis.

Pre-anæsthetic narcosis consists in the hypodermic injection of morphine, with atropine or scopolamine or both, about three-quarters of an hour before proceeding with the administration of the ether. The dose for adult males is 0.01 gm., and for females 0.007 gm. of morphine, and 0.0004 gm. each of scopolamine and atropine, or 0.0005 gm. of either separately.

It is used generally as the routine in the open ether method. It is indicated especially in anæsthetizing sthenic adults, in all alcoholic cases, in athletes, neck and throat cases, in operations on tonsils and adenoids in adults, in diabetics, in the neurotic and hysterical cases, in cases where pain is expected to follow operation, in morphine-eater cases, where local anæsthesia is used in extensive operations, besides all ether, $N_2O$ and O cases. It lessens fear of the operation very greatly, so that it diminishes shock and greatly helps the nervous patient. It greatly enhances the obtundant efficiency of ether and so further assists in diminishing shock. Anæsthesia is more easily maintained, the patient not being prone to sudden recovery. Less ether is required. It inhibits salivary secretion and thereby greatly facilitates the administration of ether and eliminates the risk of inspiration pneumonia. It shortens the induction, unless it renders the breathing shallow and the intake correspondingly less, which may occur when the open method is used but not when the closed is. In most cases, it prevents post-anæsthetic vomiting and distress, owing largely to the long sleep which often follows. It lessens the risk of acidosis. It shortens the period of muscular rigidity of induction.

It has the disadvantage, when the ether is given by the open method, of occasionally slowing the breathing to a more or less great extent. It should not be used in severe shock.

It is not used in the extremes of age or in cases of known idiosyncrasy to the drug; in cases, for instance, in whom morphine occasions prolonged vomiting with depression.

It is unwise to use as much as 0.015 gm. doses of morphine, as respiratory depression is much more prone to occur from such dose, especially when chloroform is used.

### Nitrous Oxide.

This is a gas, commonly called "laughing gas" or simply "gas." It has a sweetish taste and odour, and is non-irritating.

Formerly it was used for short operations only. Now, in conjunction with oxygen, it is used for all classes of operation. Its value rests in the rapidity of the induction of anæsthesia by it, and in the equally rapid recovery without nausea. Anæsthesia is attained in from 30 to 60 seconds, and it lasts from 30 to 45 seconds without further administration.

Although as much as two minutes' duration of anæsthesia may be secured by carrying the administration to cause extreme degrees of asphyxiation, the practice is bad. Apart from the possible danger of serious heart embarrassment from such procedure, distressing after effects not infrequently ensue from it.

The anæsthesia obtained is not as profound as that of either ether or chloroform. It is necessary to exclude air during induction, otherwise failure results or induction is effected only after much delay. On this account more or less cyanosis appears ere induction is effected. For this reason oxygen is very commonly used in conjunction.

It is administered by means of a face piece into which are inserted an expiration and an inspiration valve. To the latter, by means of a wide-bore flexible tube, is attached a large rubber bag, which is connected with the gas supply. When oxygen is used a three-way connexion joins up the oxygen supply.

When given for operations on the mouth, as in dental work, a mouth prop should be placed between the teeth before starting. This saves much time in opening the mouth. The main tap of the gas cylinder is first turned on and the small or regulating tap is opened at the time when the face piece is placed on the face. The expiration valve is left open for three or four breaths and then closed for rebreathing. Where gas is cheap, the expiration valve may be left open throughout. This, however,, is needless waste.

The best guide for a sufficient narcosis is a soft, snoring stertor. If the mask is now removed about 50 seconds of available anæsthesia is obtained. If respiration becomes irregular or feeble or the inspirations are prolonged or stridulous, or if spasms of the respiratory muscles occur at any time, the administration should be carried no further. The corneal reflex is not so good a guide as the stertor. Jactitation—that is, jerking of the limbs—denotes excessive asphyxiation and is a better guide than the colour of the face. The pupils become large as anæsthesia is induced. The corneal reflex is usually present throughout.

The average number of respirations required to induce anæsthesia is 27, the lowest being 6 and the highest 72. The longer the time taken by induction the longer is the duration of the anæsthesia following. The average quantity of gas required to produce anæsthesia is 30 litres. Alcoholics, morphine and chloral eaters require more. Gas is frequently given to patients fully dressed. Before starting the administration in such cases it is advisable to ensure that corsets be removed and all bands around the waist or neck be loose. The head should not be allowed to be bent forward; it should be sufficiently upright to secure free breathing. More or less muscular rigidity persists throughout, owing to the asphyxia involved. $CO_2$ is more stimulating in the narcosis of ether than in that of nitrous oxide. When this form of anæsthesia is employed for prolonged operations, other than oral, the face piece is removed for oxygen or air and replaced when the colour of the face indicates that the uptake of oxygen is sufficient.

The narcosis of nitrous oxide is very safe. It is free from syncopal changes in blood pressure.

### Nitrous Oxide and Oxygen.

About 5% of oxygen in the mixed gases is said to prevent cyanosis; but the patient's colour is the best criterion, that is, the amount used should be such as is found sufficient to prevent lividity. A very satisfactory anæsthesia is secured in this way, with no lividity and very little engorgement of tongue and fauces. It takes 100 seconds to induce, and the anæsthesia lasts about 45 seconds. The same guides are used as for nitrous oxide alone.

### Ethyl Chloride.

This—the most recently introduced of anæsthetic agents—is sold under a variety of proprietary names, as kelene, chloryl, etc. When mixed with methyl chloride and ethyl bromide, it is sold as somnoform. Such mixtures do not possess any advantage over ethyl chloride alone.

Ethyl chloride is a gas under ordinary pressures and temperature. It is compressed into a liquid state and sold in tubes with automatic stoppers.

It induces anæsthesia without struggling, and the induction is very rapid, the time taken being between 20 and 40 seconds; and the resulting anæsthesia lasts from 1½ to 4 minutes without addition of more of the agent. It is this longer period of resulting anæsthesia in which lies its advantage over nitrous oxide for mouth operations; but it is not as safe as that anæsthetic agent or as ether, though it is safer than ethyl bromide and much safer than chloroform. Its portability has led to it largely replacing nitrous oxide for the gas and ether sequence. It is a heart muscle poison and an active stimulant to the cardio-inhibitory mechanism. The maximum percentage vapour administered in the air should not exceed ten, and this is too much for continuous administration. Syncope may readily result from higher percentages. Such syncope, however, is not as serious as that from chloroform, since ethyl chloride is a much less active muscle poison than chloroform.

It may be administered by the open or the closed method. When the closed method is adopted, it may be given by one of the various inhalers for the purpose or by the ordinary Clover inhaler, to the outer end of the bag of which a piece of indiarubber tube has been let in so that a small graduated glass tube can be attached, into which the required quantity of ethyl chloride has been sprayed. About 3 c.cm. is the quantity employed for an adult, and 2 c.cm. for youths and delicate women, when used in the ethyl chloride ether sequence. When used to

induce and maintain anæsthesia by itself 10 c.cm. should be poured into the graduated tube. Of this 4 to 6 c.cm. will be found sufficient for women and youths, but for robust men much more is required. It is best to turn the ethyl chloride into the bag in quantities of 1 to 2 c.cm. every three breaths. The concentration thus attained corresponds roughly to from 7 to 10% air mixture. Administration is continued till the corneal reflex is abolished, then it is promptly discontinued. The administration should never be continued beyond this, otherwise syncope is very possible. It is unwise to spray the ethyl chloride into the metal part of the inhaler, for in this manner very high percentages may be administered. Formerly inhalers were constructed in a manner to admit of this.

When it is given on the open mask about 2 or 3 c.cm. at a time are sprayed on the ordinary chloroform mask. This is repeated as the ethyl chloride is about evaporated, until the corneal reflex is lost. Then it is discontinued, as in the closed method. By covering the face-piece with a small towel and thus converting the open into the semi-closed method saves waste and hastens induction.

In the ethyl chloride ether sequence the ether is run on before the corneal reflex is lost. In the closed method this occurs after 7 to 10 breaths have been taken.

It is contra-indicated in cases of embarrassed respiration or cardiac degeneration. Although it has been stated above that the syncope of ethyl chloride is not as serious as that of chloroform, this does not apply to cases of degenerated heart muscle.

#### Difficult and Complicated Cases.

*Respiratory.*—Falling back of the tongue; this is corrected by advancing the lower jaw or by inserting the pharyngeal tube. The tongue forceps or a silk thread through the tongue to hold it by are only used when other means fail to free the tongue from the air-way.

Cases of nasal obstruction are treated either by using the pharyngeal tube or the mouth gag or prop.

When vomiting occurs during the course of maintenance the mask should be removed until breathing restarts. The lower jaw should not be advanced nor the tongue pulled out, because these measures keep the glottis more or less open, thereby permitting vomited material to enter. If, however, when the efforts of vomiting have ceased and breathing efforts have recommenced, it is observed that no air is entering the air-way, then it is necessary to advance the lower jaw because the tongue blocks the pharynx. In the narcosis of chloroform pallor and shallow breathing sometimes precedes the onset of vomiting. To allow the vomited matter to escape the head should be low and well turned on one side, with the mouth open, especially in cases of intestinal obstruction, in which cases regurgitation may occur and vomited matter pour out without signs of vomiting. Such danger occurs only in the very exhausted persons. When vomited material, food, dentures or other foreign bodies have entered the larynx the finger should be inserted and any of it that is accessible removed and the pharynx swabbed out. Any fluid or solid matter still remaining may be expelled by sudden bi-manual compression of the thorax. The head and shoulders should therafter be lowered so that fluids may run out instead of into the bronchi and lungs. The presence of such foreign material in the larynx may excite a spasmodic closure of the glottis. Effort should be made to lift the epiglottis with the finger before marked lividity comes on, the only alternative is to open the trachea or larynx. During operation upon the thorax, such as for hydatid or abscess of the lnng or empyema, etc., a rupture may occur into a bronchus of that side and fluid pouring out may enter the bronchi of the other side and so cause drowning. Immediately fluid is observed pouring out of the mouth the patient should be rapidly turned so as to bring the sound side up, and then the head and shoulders lowered to facilitate the escape of the fluid. For this reason, as well as for the reason that breathing is less embarrassed, the operator should perform his surgery with the patient on his back—not on his side with the bad side up. Oxygen should always be at hand in this class of operation. The intra-tracheal method should not be used where there is fear of such a catastrophe. Only light open ether narcosis should be employed in order to preserve the coughing reflex. Very bad cases are best opened under local anæsthesia.

In cases of cerebral or cerebellar tumour, with slow pulse denoting excessive intra-cranial pressure, respiration is prone to cease when anæsthesia has been attained. This is much less likely to happen in the employment of ether than it is from that of chloroform. In such case artificial respiration should be maintained throughout the rest of the operation. Morphine pre-narcosis should never be used, and only very light anæsthesia maintained.

In cases of Ludwig's angina, retro-pharyngeal abscess, or of œdema of glottis from any cause the patients are prone to laryngeal spasm, and with the two former also there is always more or less severe myocardial weakness from the septic intoxication associated. Such patients should be operated only under a local anæsthetic.

When bronchitis and phthisis are present the patients are best anæsthetized by means of nitrous oxide and oxygen, or if this means is not available, by chloroform, or in short operations, only, by ethyl chloride and open ether.

*Circulatory.*—All acute septic conditions cause more or less myocardial enfeeblement. Syphilitic disease with cardio-vascular degeneration; patients with any form of cardiac disease with myocardial incompetence or with anæmia; patients undergoing operations in which depressor reflexes are, or in which shock is prone to occur, such as excision and other eye operations, abdominal operations entailing dragging on the contents, operations on the axilla, the neck, on piles; operations such as entail large skin incisions, as amputation of the breast, or the division of large nerve trunks, or of dragging on or excision of the kidney or operations on the lower end of the rectum, or operation on the brain, reduction of dislocated shoulder, dilation of the *cervix uteri*, operations on the gall

bladder, etc., should be anæsthetized with ether by the open or closed method. In very bad cases the safest is the closed ether method with oxygen. In such cases nerve blocking by the injection of novocaine at some point on the proximal side of the nerve, assists in preventing shock. Pre-anæsthetic narcosis should also be employed whenever not contra-indicated. In cases of shock and of collapse from loss of blood the patient should also be turned into the Trendelenburg position and the operation quickly completed.

*Other Difficult Cases.*—Diabetes: On account of the great aggravation of this condition caused by the anæsthetic and the operation, local or spinal anæsthesia is preferable to general anæsthesia. Where this cannot be done pre-narcosis with nitrous oxide and oxygen is to be preferred. Patients with renal disease do not bear anæsthesia very well; suppression of urine sometimes follows. For small operations this is not likely, and therefore any anæsthetic agent may be used; but for prolonged operation chloroform is perhaps less likely to cause suppression than ether. Nitrous oxide oxygen is not quite satisfactory for operation in kidney disease, owing to the necessity of having to eliminate morphine in the preliminary injection for pre-narcosis. Old men and women take chloroform better than ether, and it is safer in such cases than in the more robust. Children also take chloroform very well, but, of course, it carries much greater risk than the ethyl chloride ether sequence. The robust sthenic requires more of the anæsthetic to induce and maintain anæsthesia than the asthenic. He struggles more and requires much more care in the induction of anæsthesia by chloroform. Similarly morphine and cocaine takers and alcoholics. Chloroform is needed occasionally to supplement ether in effecting induction in this class. Fat people usually are favourable subjects for chloroform. Persons with short thick necks, however, frequently occasion some difficulty in the maintenance of adequate airway. The pharyngeal tube is particularly useful for such difficult cases.

In parturition, chloroform or nitrous oxide and oxygen is used for attaining analgesia, the latter being so provided that the patient may inhale it herself as she needs relief from pain. Chloroform is used for anæsthesia, though ether is also employed by some, when the forceps have to be used. Chloroform inhibits the action of pituitary.

Goître and exophthalmic goître patients are best anæsthetized by the open ether method with prenarcosis.

*Shock.*—When severe, if it be possible to postpone operation till some recovery has occurred and the body heat has been restored, the prospects are much better. Gas and oxygen are regarded by some anæsthetists as the least depressing and therefore the best anæsthetic agent. Ether and oxygen, either by Clover's method or by the warmed ether method, may be used. The after depression following ether is the danger from its use. Prenarcosis is inadmissible. Chloroform and spinal anæsthesia are unsuitable. Intravenous infusion of blood is of great value, that of saline solution is useless, unless it contains from 2% to 6% of gum arabic and is 2% bicarbonate of soda solution, instead of the usual isotonic saline solution (Bayliss) or unless Hogan's 2.5% gelatine solution is used, in order to raise the viscosity and colloidal osmotic pressure to approximately that of the blood. Inversion into the head-down position is the most important adjunct to treatment next to that of raising the body heat by external warmth.

*(To be Continued.)*

## PREVENTION OF DIPHTHERIA.

By F. R. Legge, M.B., Ch.B., Melb.,
*Health Officer, Swan Hill Shire, Victoria.*

As a commentary on the leading article on the above subject that appeared in the *Journal* on 2nd February, the following account of an outbreak that occurred in Swan Hill district in 1913 may be of interest.

There had been no case in the town for three months. On July 7 a child from New South Wales died of diphtheria in Swan Hill. On August 20 a case in a child above school age was reported, and another in the school charwoman. On September 3 a child from the infant room of the State School was reported. In the latter case isolation was not strictly carried out.

From September 20 to November 10 27 cases were reported in Swan Hill, 16 of the patients attending the State School. During the same period eight cases occurred in various parts of the district. The next and last case was reported on November 29. Two patients died.

The following means were taken to stamp out the disease. All the patients were isolated, three at home, where proper isolation was possible, the remainder in hospital. No patient was allowed free till two consecutive negative swabs were obtained. Swabs were taken from contacts, home and school. All school children were examined, two were found to be attending with diphtheria. One hundred and thirty-four swabs were taken in the school, and altogether 290 contacts were swabbed; 9 gave positive results and 3 suspicious. The children who were found to harbour bacilli were treated as patients and isolated, and their contacts re-swabbed. In suspicious cases a further swab was taken. Of the positive contacts, five were the brothers and sisters of a baby who had diphtheria; one was the mother of a girl patient four years old; two were the mother and baby brother of another patient; and one was the brother of a patient who was ill seven days before being seen.

After isolating infectious persons, the houses were disinfected. In Swan Hill 19 houses were infected; eight cases occurred in houses already infected, six of them within a few days of the first case, and two some weeks after disinfection.

The State and Sunday Schools were closed for three weeks. The State School was disinfected. Before any patient was allowed to attend school he was re-swabbed. One boy who had given three consecutive negative swabs in hospital was again positive; his baby sister had given a suspicious swab when he was first ill, and through an oversight was not re-swabbed

at that time; she again gave a suspicious results, and was isolated.

After this outbreak no case was reported in the district till March, 1914, when one case occurred in an adjacent township. The next case occurred in Swan Hill in August, 1914, in the house which gave the first infected school child in 1913. Isolation, swabbing and disinfection were carried out, and no further case was reported in the district for fourteen months.

The swabs were all examined by Dr. Bull, at the Melbourne University.

# Public Health.

## NEW SOUTH WALES.

The following notifications have been received by the Department of Public Health, New South Wales, during the week ending April 27, 1918:—

| | Metropolitan Combined District. | | Hunter River Combined District. | | Rest of State. | | Total. | |
|---|---|---|---|---|---|---|---|---|
| | Cs. | Dths. | Cs. | Dths. | Cs. | Dths. | Cs. | Dths. |
| Enteric Fever | 4 | 1 | 1 | 0 | 7 | 0 | 12 | 1 |
| Scarlatina | 10 | 0 | 0 | 0 | 18 | 1 | 28 | 1 |
| Diphtheria | 77 | 7 | 14 | 0 | 75 | 3 | 166 | 11 |
| *Pul. Tuberculosis | 19 | 11 | 0 | 0 | 0 | 0 | 19 | 11 |
| C'bro-Spl. Menin. | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |
| Poliomyelitis | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 0 |

* Notifiable only in the Metropolitan and Hunter River Districts, and, since October 2, 1916, in the Blue Mountain Shire and Katoomba Municipality.

## VICTORIA

The following notifications have been received by the Department of Public Health, Victoria, during the week ending April 28, 1918:—

| | Metropolitan. | | Rest of State. | | Total. | |
|---|---|---|---|---|---|---|
| | Cs. | Dths. | Cs. | Dths. | Cs. | Dths. |
| Enteric Fever | 1 | 0 | 3 | 0 | 4 | 0 |
| Scarlatina | 23 | 1 | 25 | 0 | 48 | 1 |
| Diphtheria | 69 | 1 | 70 | 1 | 139 | 2 |
| Pulmonary Tuberculosis | 24 | 11 | 12 | 3 | 36 | 14 |
| Poliomyelitis | 4 | — | 11 | — | 15 | — |

## QUEENSLAND.

The following notifications have been received by the Department of Public Health, Queensland, during the week ending April 27, 1918:—

| Disease. | No. of Cases. |
|---|---|
| Enteric Fever | 11 |
| Scarlatina | 8 |
| Diphtheria | 54 |
| Pulmonary Tuberculosis | 6 |
| Cerebro-spinal Meningitis | 1 |
| Puerperal Fever | 1 |
| Poliomyelitis | 1 |
| Erysipelas | 2 |

## SOUTH AUSTRALIA.

The following notifications have been received by the Central Board of Health, Adelaide, during the week ending April 27, 1918:—

| | Adelaide. | | Rest of State. | | Totals. | |
|---|---|---|---|---|---|---|
| | Cs. | Dths. | Cs. | Dths. | Cs. | Dths. |
| Enteric Fever | 0 | 0 | 4 | 0 | 4 | 0 |
| Scarlatina | 1 | 0 | 11 | 0 | 12 | 0 |
| Diphtheria | 2 | 0 | 21 | 0 | 23 | 0 |
| Pul. Tuberculosis | 1 | 0 | 4 | 2 | 5 | 2 |
| C'bro-Spl. Meningitis | 0 | 0 | 1 | 0 | 1 | 0 |
| Puerperal Fever | 0 | 0 | 1 | 0 | 1 | 0 |
| Erysipelas | 0 | 0 | 4 | 0 | 4 | 0 |
| Morbilli | 1 | 0 | 1 | 0 | 2 | 0 |
| Pertussis | 0 | 0 | 2 | 0 | 2 | 0 |

## WESTERN AUSTRALIA.

The following notifications have been received by the Department of Public Health, Western Australia, during the week ending April 20, 1918:—

| | Metropolitan. Cases. | Rest of State. Cases. | Total. Cases. |
|---|---|---|---|
| Enteric Fever | 4 | 3 | 7 |
| Scarlatina | 19 | 3 | 22 |
| Diphtheria | 19 | 9 | 28 |
| Pulmonary Tuberculosis | 3 | 3 | 6 |
| Poliomyelitis | 1 | 0 | 1 |
| Ophthalmia (purulent) | 1 | 0 | 1 |

## TASMANIA

The following notifications have been received by the Department of Public Health, Tasmania, during the week ending April 27, 1918:—

| Disease. | Hobart. Cases. | Launceston. Cases. | Country. Cases. | Whole State. Cases. |
|---|---|---|---|---|
| Enteric Fever | 2 | 1 | 2 | 5 |
| Scarlatina | 0 | 1 | 0 | 1 |
| Diphtheria | 0 | 5 | 22 | 27 |
| Pulmonary Tuberculosis | 0 | 0 | 2 | 2 |
| C'bro-spinal Meningitis | 0 | 0 | 1 | 1 |
| Puerperal Fever | 1 | 0 | 0 | 1 |

# Naval and Military.

## CASUALTIES.

In our issue last week we announced the death of Captain Wade Shenton Garnett. In the 395th list of casualties, which was issued on May 4, 1918, the name of Captain Garnett is entered among those wounded. In the 396th list, issued on the same day, there is an entry to the effect that he had died of wounds. It appears that Captain Wade Shenton Garnett was attached as regimental medical officer to an infantry brigade, and that he died on April 15.

News has been received to the effect that Captain James Beverley Metcalfe, M.C., has died of wounds. It will be remembered that his brother, Captain Frank Bramall Metcalfe, A.M.C., died on October 6, 1917, as the result of shock following on an operation. He had been severely wounded, and the operation was undertaken in the hope of saving his life. About the same time Captain James Beverley Metcalfe was reported to have been severely wounded. He eventually recovered sufficiently to return to his duty. Up to the present we have no news concerning the circumstances in which he met with his second wounding.

## APPOINTMENTS.

The following notices have appeared in the *Commonwealth of Australia Gazette*, No. 64, of May 2, 1918:—

Naval Forces of the Commonwealth.

*Payment to an Officer Acting in Higher Rank.*

Surgeon William James Carr, B.A., M.R.C.S., L.R.C.P., is to be paid rates of pay and allowances as for Staff Surgeon (on promotion), whilst temporarily acting in that rank. To date 14th March, 1918.

*Termination of Appointment.*

The temporary appointment of Acting Staff Surgeon Frederick Hamilton Kenny is terminated as from 21st March, 1918.

*Transferred to the Retired List.*

The following officer is transferred to the Retired List as on the date shown:—

Surgeon Arthur Charles Robert Todd, on being "Invalided," 30th November, 1917.

Royal Australian Naval Brigade.

*Appointment.*

Surgeon Herbert Grindell Hurley, M.B., M.S., is appointed District Naval Medical Officer, Brisbane, with salary at the rate of £150 per annum, *vice* Staff-Surgeon Francis Wilson (deceased). To date from 13th January, 1918.

The Medical Journal of Australia.

SATURDAY, MAY 11, 1918.

## Anæsthesia and Anæsthetists.

Few people are able to appreciate to its full extent the boon conferred upon humanity by the induction of anæsthesia. The blessing of unconsciousness during a surgical operation is not the only advantage. Modern surgery has been rendered possible by the discovery of anæsthetic compounds and of their pharmacological action. In the pre-anæsthetic days, even the most skilled surgeons were barred from undertaking operations requiring muscular relaxation and complete quietude of the patient. Anæsthesia is employed so freely and for such trivial procedures that the world has come to regard it as a matter of little moment, and the attendant dangers now obscure to a large extent its wonderful benefits. The induction of inhalation narcosis is at once an art and a science. Dr. Embley has given the medical profession in Australia a masterly exposition of the art and a skilful outline of the more practical aspects of the science. His contribution marks in a fitting manner his retirement from the position of Lecturer and instructor on anæsthetics at the Melbourne University. His original work on chloroform poisoning and on the pharmaco-dynamics of anæsthetics, which is, or should be, familiar to every student of medicine throughout the Commonwealth, constitutes a sound basis for the teaching of the practice of inducing anæsthesia. It is a result of his work, and of the work of other investigators, that the risks of anæsthesia have been diminished. Researches and practice by men trained as experts have converted a highly dangerous procedure to one almost devoid of real risk. Unfortunately accidents continue to occur in practice, notwithstanding the assiduous attention that has been given to this important science and art. It may be that in certain cases the risk of death cannot be foreseen and prevented. The condition spoken of as *status lymphaticus*, if indeed this represents an actual pathological condition, is supposed to be undiagnosable in certain cases. Some pathologists have questioned the reality of a *status lymphaticus*, although the evidence adduced up to the present is not conclusive. Anæsthesia induced under ordinary conditions should be a safe undertaking, and would be safe, if the art and science were properly taught in our Universities and great hospitals. While Dr. Embley finds it necessary to deal with the whole subject and guide his pupils carefully, and in considerable detail, concerning the proper methods of induction with chloroform, ether, and other anæsthetic vapours, it has become the habit in other schools to attempt to circumvent the risks by excluding chloroform from the list of drugs to be used for this purpose. Waller has claimed that chloroform is a more powerful anæsthetic and has several advantages over ether. He has endeavoured to prove that if the volume percentage of the vapour in air be kept below 2.5, the dangers of overdose practically disappear. On the other hand, Dr. Embley has demonstrated that a 2.2 volume per cent. dilution of chloroform vapour is nine times as powerful a myocardial depressant as a 19.1 volume per cent. dilution of ether vapour. There thus appears to be ample justification for the preference for ether under usual conditions, but it should also be recognized that circumstances arise when chloroform should be given rather than ether, and the skilled anæsthetist must be trained to use it.

The example that Dr. Embley has set in Melbourne is worthy of imitation. In hospital practice, at least, the induction of anæsthesia should be undertaken by a specialist who devotes his energies to this subject, and who has made himself a master of the art and of the science. At the same time, students should be taught, not only in lectures, but also in the operating theatre, how to induce anæsthesia pleasantly for the patient and how to select the most suitable agent for each particular set of circumstances. The practical and theoretical training should be earnest and thorough, and the teacher should realize that the safety of hundreds of persons depends on the skill with which he imparts the knowledge he has laboriously acquired. The habit of leaving the student or young graduate to find out

how to induce anæsthesia, what agent to use, how to handle his patient so that he may be spared unnecessary fear and discomfort, and how to avoid dangers, is fraught with objections and should not be permitted. In many hospitals the young resident medical officer, for the first time in his life, finds himself called upon to give an anæsthetic. His courage and a small quantum of theoretical knowledge enable him to perform his task—somehow. The experience is anything but pleasant for the patient. His other duties are so onerous and many that it is impossible for him to educate himself in the art and science of anæsthetics. He perpetuates the faulty methods, born of necessity, and even after he has a record of some hundreds of inductions, there is still a wide chasm between his practice and that of an expert anæsthetist.

## UNFITNESS.

It has often been said that health is a national asset. In these times when every man of military age is needed, and when physical defects mean waste, inefficiency and decadence, the medical profession should be prepared to perform a double duty. An inventory of the defects present among the community should be taken, and an organized campaign should be planned with the object of removing these defects in so far as they are remediable. Australia has recently been shocked by the information that ten thousand of her soldiers were found to be unfit for military service after their arrival in England. A recent report contains a reference to a very much larger number. The number of rejections on account of physical unfitness which have been effected within the Commonwealth, has been large. A survey of the military experience would reveal the index of physical defect among the members of the community between the ages of 18 and 45 years. But before the information gathered by the medical officers at the examination of recruits, and by the British authorities at the re-examination of soldiers after training, could be accepted for statistical purposes, it would be necessary to verify the findings and to assess some standard, according to which the unfit could be grouped. At present we know of no collected information which would assist us in ascertaining the frequency of the various causes of unfitness in the Commonwealth population. In a recent issue of the *Journal of the American Medical Association*, Dr. E. L. Fisk, the Medical Director of the Life Extension Institute of New York, has collected some valuable information from the medical boards of Detroit, Brooklyn and New York, and has subjected this information to a searching analysis. It appears that the percentage of rejection in the American Army, including the rejections after entry into camps, was 33.1%. The figures on which this calculation was made were 3,082,946. Dr. Fisk was able to review the records of 8,875 men called up for enlistment. Of these 2,232, or 29%, were rejected by the medical boards. The individuals were between the ages of 21 and 31 years. It appears that 6% of the rejections were provoked by gross defects of the eyes, 4.8% by extensive defects of the teeth, and 4.6% were due to the recruit being markedly under weight, while hernia, lesions of the heart, deformities of the feet, injuries to limbs, tuberculosis, genito-urinary affections, varicose veins, syphilis, asthma, insanity and mental defects were also relatively common. Dr. Fisk maintains that eye defects to a degree that disqualifies for military service, should be regarded as indicating a degenerative tendency, usually associated with some fault in nutrition, or in the care of the body or in the use of the eyes. He summarizes his investigations by stating that at least 60% of the rejected men owe their impairments either to ignorance or to neglect. He sketches the means that should be adopted to remove this national disability. The indictment is a severe one. The figures reveal that between 30% and 40% of men between the ages of 21 and 31 years are physically impaired, and it is fair to assume that at least 60% of those between 31 and 45 years would be found to be similarly handicapped.

The problem as it presents itself to America is no doubt a very different one to the problem existing in Australia to-day. America has an enormous population and an army of five million men can easily be found, notwithstanding the frequency of unfitness. America has taken the power to control her virile population at will. Australia is labouring to reinforce her loyal sons who have gone forth of their own free will. If 50% of males between the ages of

18 and 45 years are physically unable to take up arms, the nation is in urgent need of an energetic campaign to remedy the preventible defects. There is no time to lose. No one can tell what difficulties we may yet have to face in the next few years. No one can be sure that we may not have to put forward every individual, weak as well as strong, to help in the titanic struggle. The age for combatants may be extended to include men up to 60 years, and every man who has neglected his health and strength may prove a burden to the State. The first step should be the taking of a survey of every male individual in the Commonwealth and the classification of the male population according to the presence of incapacitating defects. The examination, to be of value, must be thorough and not like the hurried inspection commonly conducted among school children. The second step should be the setting up of a register of all who are unfit from a military standard. Each man whose name is entered on these lists, should be warned that his primary duty to his country is to place himself under medical or dental treatment for the removal of his disability or disabilities. A control survey would reveal whether it would be necessary to enforce treatment, as is done among the recruits in the British Army.

## ALCOHOL AND THE WAR.

Both in this country and in Great Britain an animated controversy is being conducted between the prohibitionists and those who take a more moderate view on the question of the abuse of alcohol during war time, and its remedies. In this controversy the man with vested interests naturally becomes alarmed lest the sources of his gains are cut off. While it would be intolerable to permit one class of the community to profit at the expense of national efficiency, it has been found advisable by economists, when dealing with social reforms, to have some regard to old-established industries and to endeavour to protect them against unnecessary depredation. The question of the use and abuse of alcohol should be a medical one, and the measures adopted to combat the admitted evil should be the remedy prescribed by the medical profession. Unfortunately, as much difference of opinion exists within the rank of the medical profession as outside it. A valuable contribution to the discussion has beeen added by Major Sir Robert Armstrong-Jones, Lecturer on Mental Diseases to Saint Bartholomew's Hospital in London.[1] In regard to the pharmacological action of alcohol, he states that it stimulates the heart and circulation, increasing the force and frequency of the pulse and the functional activity of the nervous system. By checking tissue change, it tends to lower the temperature of the body. He holds that no physician is ever justified in prescribing alcohol for its purely soothing, stimulating, or narcotic effects. "Its legitimate use is in those extremely serious nutritional disturbances, such as threaten to be the last moments of life." In these states he has known it to prolong the life struggle. Turning from disease to health, he decries the daily use of alcohol by persons not beyond middle life, and even for these he recognizes dangers and objections. Nevertheless he is prepared to accept the opinion of officers and men that the "rum ration" is useful in helping soldiers to withstand the continuous exposure to wet and cold in the trenches. But he regards the use of alcoholic liquor as an ordinary article of diet as a dangerous temptation to young officers and men. Of the use of the "rum ration" given for the purpose of enabling the men to "keep their nerve" in No-Man's Land, he makes no mention. It is unnecessary to follow him through his dissertation concerning the action of alcohol as a protoplasmic poison. This matter has been established beyond dispute. No one with experience will contradict him in his assertion that where there is intemperance there, also, are crime and insanity. He estimates that approximately 3,000 persons become insane each year through drink in England and Wales.

Sir Robert Armstrong-Jones is probably treading on less secure ground when he attempts to argue that the tolerance possessed by some folk to alcohol, and more especially in regard to its power to produce the symptom complex usually known as drunkenness, may be analogous to the immunity possessed by certain species of animals to specific infections. Neither this aspect of the question, nor yet the physiological effect on the mental functions in different individuals need concern us at present. Of immediate importance is the discussion into which he enters concerning the means to be employed to stem the ravages which alcohol produces in the community. Men with extensive experience hold divergent views concerning the prospects of harm or good ensuing when the sources of alcohol are not cut off. Many chaplains, noted as total abstainers, have expressed themselves in favour of permitting the sale of light wines, beer and spirits during meals, but all condemn the sale of intoxicating liquor at the *estaminets*. The prohibitionist is apparently unable to realize that the soldier can be safe in an environment where alcohol can be purchased. The extreme moralist pins his faith on the power of example, of preaching and of a sense of duty to keep large masses sober, as long as they are trusted to have a little alcoholic beverage with their meals. In all probability the ardour of both extremists leads them too far. An important lesson, however, may be learned from the history of the Liquor Traffic Control Board, which was appointed in 1915, with powers to make its own regulations. This Board set itself the task of stopping continuous drinking and of modifying drinking at frequent intervals. In the first place, many licensed premises were closed, and some breweries. The Board assumed the part of retailers, placed disinterested

[1] *The Practitioner*, March, 1918.

managers in charge of the houses and instructed them to seek a profit from the sale of food and not of drink. The houses were closed except at meal times, and the entertainment and recreation for the guests were provided. The sale of spirits was discouraged, and under no circumstances were children under 18 years of age served with strong drinks. Dilution of alcoholic beverages was permitted. In the last place, the managers were given power to provide postal and banking facilities for their customers. All licensed premises were subjected to inspection, and Sunday closing was effected. The results of these measures were most striking. Drunkenness, as measured by convictions in the police courts, was reduced, in 1916, to less than one half of its former frequency. The streets became more decorous, railway stations more orderly and the crowds less excitable. The minds of the workers became healthier and their work better. Why listen to the voices of critics, when results such as these can be attained. That the Labour Council in Carlisle should protest against the interference with the comfort and freedom of the working man is of no moment. The Board was able to override these objections. Similarly, the objections of the prohibitionists that the benefits were not real, and that while there were less convictions, there was more secret drinking, were not difficult to meet. The fact that order had replaced disorder, and that efficiency was met with in all industrial undertakings, gave the lie direct to the opponents to the Board. It should not be supposed that the plan is entirely original. It coincides almost entirely with the programme of the True Temperance Association, whose scheme of the improved public house attracted much attention some ten years ago. We have thus another instance of a policy of moderation, fairly administered, leading to better results than all the proposals of the extremists.

## TRANSFUSION OF BLOOD.

The transfusion of blood from a healthy person into the veins of a patient has been often advocated since the benefits to be derived from introducing more or less blood in various conditions have been incontrovertibly demonstrated. The practice of transfusing blood has not, however, been universally adopted even in those cases in which its use would appear to be strongly indicated. The disinclination of surgeons and physicians to employ this remedy arises, in part, from a knowledge of the dangerous effects which may follow its use and, in part, from the lack of agreement among the advocates as to the best method of carrying out transfusion. It is recognized that the recipient may suffer harm in a variety of ways. Sudden death may occur from intravascular coagulation of the blood. Thrombosis may be produced by less extensive clotting and embolism may result from the introduction of a clot into the circulation. Sepsis may follow the admission of micro-organisms and pyæmia has been noticed after transfusion. The study of the hæmolytic and agglutinative properties of various blood sera has made it evident that the admixture of bloods of different individuals may lead to the destruction of erythrocytes. Transfusion may thus occasion the disappearance of blood corpuscles instead of the presence of a greater number of blood corpuscles in the circulatory vessels of the recipient.

The progress of medical knowledge and numerous trials of different ways of transfusing blood have done much to lessen the dangers of transfusion. Suitable methods have been devised for ascertaining the compatibility of the bloods of the donor and the recipient. Tests are available for determining the absence of syphilitic, protozoal and microbic contagion from the blood of the donor. Processes of administration can be used in which the amount of blood passed into the patient's veins can be accurately measured and the presence of any clots avoided. It is now considered that there should be no contact between the donor and the recipient, that sepsis can be easily prevented by the proper use of heat in sterilizing cannulæ, tubes and vessels, and by the usual aseptic precautions in making the incisions, and that the coagulation of the blood may be hindered by employing tubes and glass-ware coated with paraffin or by the addition of sodium citrate to the blood.

The experience of transfusing blood in 200 persons is utilized by A. R. Kimpton for a discussion[1] of the conditions in which transfusion is indicated. He is of opinion that transfusion is of value in the treatment of acute secondary anæmia, of chronic secondary anæmia and of chronic primary anæmia, but that it is without value for acute primary anæmias. In massive acute hæmorrhages immediate benefit may result from introducing blood. A patient, cold, with a rapid, thready pulse, or pulseless and white, with no capillary reaction, may show after transfusion an improvement in colour and an increase in bodily warmth, with a return of pulse or a diminution in pulse-rate. Such a change may be witnessed after bleeding from varied causes, such as post-operative hæmorrhage, rupture of ectopic pregnancies and of spleens, uterine fibroids and *post-partum* hæmorrhage, when 800 c.cm. to 1,000 c.cm. blood are given into a vein. Unless the bleeding point has been secured, not more than half a litre of blood should be administered. The effects of a single sudden bleeding are more readily abolished than those of repeated bleedings of less extent. In acute secondary anæmia the recovery of the patient is hastened by transfusion, even when the hæmorrhage has been stayed by surgical means before the signs and symptoms of loss of blood have been manifested. The time of convalescence of patients with chronic secondary anæmia may be shortened by transfusion. Weeks of tedious recovery may be avoided by this procedure, which should be regarded, according to Kimpton, as a surgical measure devoid of risk under these conditions. The introduction of 60 c.cm. to 120 c.cm. of blood into the longitudinal sinus or into an external jugular vein is advised in the hæmorrhages of new-born infants. Kimpton states that there is no condition in which the effects are more rapidly noticed. The donor should be one of the parents. Almost every infant recovers, provided that the bleeding does not result from congenital defect of the biliary passages. In hæmophilia transfusion cures the attack, though it does not influence the disease. It

[1] *Boston Med. and Surg. Journal*, Vol. CLXXVIII., p. 351, March 14, 1918.

will not infrequently save the life of a "bleeder" after a severe hæmorrhage. In these patients the donor should not be a relative, though the blood of the mother has been employed in a successful transfusion. This remedy has given satisfaction in the treatment of the hæmorrhage of enteric fever. In poisoning by carbon monoxide, transfusion is said to be more successful if preceded by venesection. In the treatment of sepsis and shock the results have been unsatisfactory, though transfusion is occasionally highly successful in shock following a sudden hæmorrhage. Kimpton mentions the case of a brakeman, who lost both legs above the knees by falling beneath a train. The patient was *in extremis* with shock, but rallied immediately upon receiving a prompt transfusion. In acute lymphatic leukæmia little improvement is observed after transfusion, while, in pernicious anæmia, amelioration follows after transfusion, though relapse occurs after an interval varying from a few days to two years. The life of the patient may be prolonged by repeated transfusions. In regard to the choice of the donor, Kimpton does not consider it is at all necessary that the donor be a relative. Any healthy, robust person, of either sex, who shows no clinical signs of syphilis and reacts negatively to a Wassermann test, may be used, provided that the blood gives no serum reactions or anaphylactic response with the patient's blood. In emergencies agglutinative tests can be done in twenty minutes on a microscopical slide. In respect to method of administration, Kimpton uses paraffined tubes holding 250 c.cm. of blood, which are filled from the donor's vein, and from which the blood is expelled into the veins of the recipient by gentle air pressure. Reactions are rarely seen after the administration of undiluted blood. The difficulties of transfusion have been overcome in various ways, but the successful use depends on attention to many details. A thorough knowledge of a single method is more likely to lead to its judicious use than a cursory acquaintance with several processes.

## RELAPSE IN MALARIA.

Modern research is gradually supplying answers to questions which have been regarded for centuries as unanswerable. But a few years ago no one had any conception why an acute febrile process, such as scarlatina or morbilli, spontaneously came to an end if the patient did not die within a given number of days. Facts have been revealed which explain the epidemic incidence of disease and the nature of the protection which one attack of certain diseases confers. The nature of relapses in the course of various infections has been studied and some information has been collected. Protozoologists who have paid close attention to the study of malaria, have long endeavoured to explain the apparent anomalies connected with the occurrence of relapses after relatively long periods of absence of clinical signs of disease. Schaudinn held that the macrogamete which persists in the blood and internal organs, may under certain conditions give rise to a fresh attack. He claims that the relapse is in fact due to parthenogenesis of the macrogametes. This view has not found favour, chiefly because, in other protozoal diseases, it has been found impossible to infect an animal with gametocytes. It has been shown that the asexual cycle continues long after the last manifestations of malarial fever, and consequently both Schaudinn's theory and the theory of a resistant form of parasite, which escapes the action of quinine and which is capable of lying dormant in some situation for variable periods, become highly improbable. Dr. Eugene R. Whitmore[1] has recently called attention to the fact that in *Haemoproteus columbae* only gametocytes are found in the red blood corpuscles, and that the infection cannot be passed on by injection of blood. In this condition schizogony takes place in the leucocytes or endothelial cells in the internal organs. In malaria and in *Proteosoma* infection the schizonts and the gametocytes are in the red blood corpuscles, and in both the infection can be transmitted by injection of blood. Dr. Whitmore has been able to infect from fresh birds with the blood of a bird infected with *Proteosoma* as long as 29 months after the inoculation. Moreover, he has noted that after all parasites have disappeared, no immunity exists, but while the birds are infected, a superadded infection is impossible. It has been shown that at times the attacks of fever become milder and fewer, even when no treatment is employed, both in *Proteosoma* infection and in human malaria. Finally the parasites may die out. He suggests that this is due to the production of antibodies which inhibit the growth of parasites and may even destroy them. More commonly, however, the antibodies are not able to destroy the parasites, but merely prevent them from multiplying rapidly. The asexual cycle is kept up in the more resistant forms. Should anything occur to lower the antibody production in the host, the parasites again assume their original activity and a relapse takes place. He suggests that when the infection ceases, either as a result of antibody action or in response to treatment, the stimulus to antibody production is withdrawn, and the person or bird becomes susceptible to re-infection. These views are somewhat similar to the theories set up by Bignami, who prefers to regard the inhibition to the free multiplication of the parasites as a phase of immunity.

Many persons, including members of the British Medical Association, appear to be labouring under the erroneous impression that the prosecution of the individual describing himself as Harry Christian Watson was undertaken at the instigation of the Victorian Branch of the British Medical Association. Mr. C. Stanton Crouch acted as informer, but did so in his private capacity, and not as Secretary of the Victorian Branch. In England, the British Medical Association frequently acts as complainant in ethical cases brought before the General Medical Council, but as far as we are aware, the Association has not acted as informant in prosecutions against unregistered practitioners in the courts of law. In Australia the several Branches of the British Medical Association could take action with the view of having the name of a practitioner removed from one of the registers, but hitherto no use has been made of this. On the other hand, it must be recognized that the British Medical Association has an undoubted right to take all steps possible to uphold the honour and interests of the medical profession. The combating of unregistered practice is also a legitimate function of the representative association of the medical profession.

[1] *Johns Hopkins Hospital Bulletin*, March, 1918.

# Abstracts from Current Medical Literature.

## OPHTHALMOLOGY.

### (162) Salvarsan and Other Remedies in Ophthalmic Practice.

Freeland Fergus, beginning with a caustic criticism of Darier's book on "Therapeutics," expresses his scepticism of many of the drugs that have of recent years been vaunted as specifics for various diseases. (*Archives of Ophthalmology*, January 1918). Boracic acid lotion used in a flask is absolutely useless. Germs in the conjunctival sac cannot be killed, but can be removed by using a pint of isotonic lotion—preferably of sodium chloride—as a good douche with a fall of 45 centimetres. Zinc sulphate is an exception—it does destroy the Morax parasite. The value of argyrol, protargol and collargol consists in the fact that they are harmless, unlike strong solution of silver nitrate used recklessly.

According to the author, salvarsan is a failure in interstitial keratitis. He refers to five cases of ocular syphilis, besides interstitial keratitis, in which salvarsan or neo-salvarsan was employed. One patient with iritis was pronounced cured after salvarsan, and ten months afterwards returned with suspicious signs of tabes. A second patient with unilateral optic neuritis, after treatment returned with iritis. A third developed optic atrophy immediately after treatment. The fourth was a case of internal rectus paralysis, whose condition became worse after treatment. The fifth, after treatment, developed acute choroido-retinitis. These patients before the recurrence showed negative Wassermann reactions. The author is not dogmatic, but holds his opinion in reserve.

### (163) The Production of Cataract.

W. E. Burge reports the results of numerous experiments to discover the cause of opacity of the lens (*Archives of Opthalmology*, January, 1918). Analyses of normal and cataractous lenses show in the former the merest trace of calcium, sodium and silicon, whereas in the opaque lens there is 12.5% of calcium in the ash in American eyes and 6% in Indian; and 23.52% sodium in American and 25.06% in Indian, and 3.63% of silicon in Indian lenses. Lenses immersed in 15% sodium chloride, and in 5% calcium chloride for 15 hours were found to be cataractous. Sodium and potassium chloride produced nuclear opacity, and calcium chloride produced cortical opacity.

Effects of Infra-red.—Lenses exposed to an electric furnace at 1,000° C., at a distance of 15 cm.—provision being made to keep the lenses cool—did not become opaque after many hours. When the distance was reduced to 5 cm. they became opaque in ten minutes, but in this case the temperature in the lenses was found to be 80° C.. Hence the opacity was due to the heat and not to red and infra-red radiation.

Effect of Ultra-violet Radiation.—Lenses introduced into quartz tubes filled with egg-white, blood serum, aqueous and vitreous humours, respectively, and placed under running water, were exposed, at a distance of 5 cm., to a quartz mercury-vapour burner. The egg-white and blood serum were coagulated after 20 hours and the aqueous and vitreous had become turbid. The lenses on the other hand were quite transparent, even after 100 hours' exposure. Lenses were then immersed in 0.1% calcium chloride, 0.1% magnesia chloride, 0.1% sodium silicate, and 1.0% dextrose respectively for two hours, and then exposed to the different forms of light. Infra-red and the visible spectrum were found to have no effect on transparency, but ultra-violet radiation produced opacities. Ultra-violet rays, therefore, fail to precipitate lens protein in its native state, but do so when the lenses are immersed in these salt solutions. Ultra-violet radiation was found to kill paramecia by the coagulation of its protoplasm. Frogs immersed in the various salt solutions for 15 days were subjected to ultra-violet rays, with the result that the eyelid was converted into an opaque mass; and cataract was produced in the eyes of fishes living in salt solution for ten days and exposed from time to time to ultra-violet radiation.

### (164) Intracranial Aneurysm of the Internal Carotid Artery.

J. R. Shannon reports the case of a lady aged 52 who complained of gross loss of sight in the right eye. (*Archives of Ophthalmology*, November, 1917). The only physical sign revealed on examination was a small central scotoma for form and colour. After four months the nerve head became pale, and sight began to fail in the left eye, with a central scotoma, and a sector-shaped defect for colour in the temporal field. A decompression was then performed over the right frontal lobe, but nothing was discovered. About a month later she suddenly became unconscious, and died ten hours afterwards. The autopsy disclosed a ruptured aneurysm of the right internal carotid artery. The growth was so situated as to press upon the right optic nerve, which was atrophied, and to less extent on the chiasma and left nerve. The symptoms in this case were purely ocular. These cases are seldom, if ever, diagnosed before death.

### (165) Loss of Sight Completely Relieved by Sellar Decompression.

W. R. Parken's patient was a man of 33 years, who was suffering from almost complete loss of sight in the right eye, and commencing failure in the left eye. (*Archives of Ophthalmology*, November 1917). The fundi showed no very definite changes. The right field was almost lost, except for a small temporal island. The left field revealed temporal hemianopsia for green, but was otherwise normal. A radiogram showed increase in the size of the sella in the horizontal plane. The von Pirquet tuberculin test was positive; and the Wassermann test negative. Diagnosis of pituitary tumour was made, and decompression advised. After a short unsuccessful trial with neosalvarsan and mercury, the operation was performed for the removal of a portion of the pituitary struma. Five days after the operation vision began to improve, till the central vision in the right eye was normal, and the field defect present only in the inferior and nasal quadrant. The patient was taking 0.3 gramme of the extract of the whole pituitary gland three times daily.

### (166) Iridotasis.

D. Harrower reports his experience after performing iridotasis in 23 cases for chronic glaucoma, and for the relief of pain in blind eyes. (*Archives of Ophthalmology*, January 1918). With cocaine anæsthesia an incision is made in the conjunctiva 10 mm. behind the cornea, and the whole tissue separated from the sclera down to the sclero-corneal junction. An incision is then made in the corneal margin and the pupillary edge of the iris is grasped with a forceps and drawn into the wound. The conjunctiva is then smoothed back into place. The stretching of the iris seems to play an important part in the result. The author considers his operations to have been successful.

### (167) Ocular Changes in Acne Rosacea.

M. Uribe-Troncoso describes the case of a farmer, 44 years old, suffering from *acne rosacea*, who sought advice for the right eye. (*Archives of Ophthalmology*, January 1918). The conjunctiva was strongly injected, and on the inner portion of the cornea was a stripe of dense grey-white infiltration ending in a broader white crescent. On the surface of the stripe ran many blood vessels, and around it was a dotted zone of infiltration. In the outer and lower quadrant of the cornea was another band of infiltration. A fortnight later there appeared a yellowish-white inflammatory nodule upon the sclera near the external angle. This case illustrates one of the ocular complications of *acne rosacea*. Sometimes ulcers form on these infiltrated patches, and in one case a hypopyon was described. Iritis also has been observed and the formation of nodules on the sclera. *Rosacea keratitis* differs from the phlyctenular variety by the presence of the faint dotted infiltration area around the corneal lesion, but, in the absence of the skin disease, no differential diagnosis could be made. According to our present knowledge phlyctenular keratitis is produced by some intoxication, either tubercular or of intestinal origin, together with an irritative local agent. The same factors account *rosacea ocularis*. Simple rosacea without acne does not produce ocular changes.

## LARYNGOLOGY AND OTOLOGY.

### (168) Sinusitis in Infants.

According to Ross Hall Skillern, the title of sinusitis of infants is a misnomer, for, he maintains, such a conditions, *per se*, does not exist (*Journ. Amer. Med. Assoc.*, September 15, 1917). The ethmoid is the only well-developed sinus existing at birth, the maxillary being then small and rudimentary, even smaller than the bulla cell. The true sinuses develope from ethmoid cells, the antrum developing first and enlarging rapidly. Under the age of two years the sphenoid is but an indentation, and the frontal only potential. The transitional stage of these two sinuses is from 2 to 6 years, after which age the two sinuses have become well developed, and occupy their permanent positions in relation to surrounding structures. The author was unable to find any cases of localized sinusitis in infants on record. Sinus affections of infants under two years are invariably part of general affections of most of the lateral nasal wall. Such infections are generally very acute and severe, the mucosa and underlying bone being attacked. The disease spreads through the canaliculi and shows a marked predilection to point and rupture externally either above or below the orbit, according to the position of the bone involved. The first indication of trouble may be a slight swelling and redness to the median side of one eye, slightly anterior to the lachrymal bone and tear-duct, accompanied by a purulent discharge from that side of the nose. The tear-sac is often involved. After the rupture the acute symptoms subside, the discharge becomes chronic and the fistula permanent. If seen sufficiently early a thorough endonasal curetting of ethmoid cells and antrum may prevent the fistula forming and bring about a cure. A discharge generally continues for some months after the acute symptoms have subsided. After five years of age the sinusitis is similar to that of adults, and generally follows a cold in the head. It does not show the tendency to involve the great amount of tissue or to reach such an abrupt climax as seen in younger children. The older the child the greater is the tendency to chronicity and limitation. Sinusitis in children may appear as a continuation of a chronic cold, with vague headaches, intermittent, though persistent, occlusion of one side of the nose with purulent discharge from that side, together with malaise, anorexia, anæmia, etc. As to diagnosis, in a recent case the predominant symptom is the profuse nasal discharge. Adenoids, associated with postnasal suppuration, or infected nasopharyngeal adenoid tissue must be differentiated by proper examination or curetting. Cleansing the nose of secretion and shrinking the mucosa will allow the approximate place of secretion to be seen by the nasopharyngoscope. Roentgenoscopy is of assistance in indicating the size, shape and condition of the sinuses, but the author considers the puncture-needle and trans-illuminating lamp of little service. General and conservative intranasal treatment in the beginning of an attack, especially in frontal and ethmoidal trouble, is effective. Calomel, 6 mgrs., with *sod. bicarb.* 6 cgrs. hourly, until purgation is produced, is advised, and locally a cleansing douche of physiological sodium chloride solution several times daily. Vaccines are more useful in this class of sinus disease than in any other. The indications for surgical treatment are very definite, and, if necessary, should be performed at once, as the disease progresses so rapidly that a simple conservative method is generally of no avail. The intranasal exenteration of the diseased ethmoidal cells and maxillary antrum, with subsequent application of organic silver compounds, and administration of appropriate vaccines is advised. If there is much redness and swelling in the region of the eye externally, or if a fistula has formed, an external incision is required, sufficiently large to ensure free drainage. The bulk of the work should be intranasal. All patients recover under this form of treatment. Operations on the maxillary sinus should not be performed through the canine fossa on account of destruction of teeth germs which must follow.

### (169) Ear Injuries and Diseases in the French Army.

From statistics gathered by himself and those supplied to him by the French War Office, W. S. Bryant concludes that the ear patients amount to about the same number as the eye patients (*Journ. Laryng., Rhin., Otology*, November, 1917). He found that there were more patients with total loss of function among eye than among ear patients, and also a larger proportion of patients recovering quickly, but that there was a greater portion of ear patients with a great impairment of function than with the eye patients. In the Zone des Armées at the front, 16% of the patients suffered from ear troubles in the Evacuation Hospitals, and 4½% of these patients were evacuated to the rear. In the rear of the Zone des Armées 4½% of the sick in the Etapes zone were affected with aural disease, while 7% of these were evacuated to the interior, where ear patients form 9% of the total sick. These numbers, for various reasons, probably represent only about half the potential ear patients. The author estimates that 80% of the ear patients will show considerable permanent impairment of function, and that the pension claims for aural disabilities will amount to a minimum of 24 per 1,000 of the fighting force per year. He employs the following grouping of ear injuries: rupture of tympanic membrane; complications of ruptured tympanum, (*a*) suppuration of middle ear, acute and chronic, (*b*) mastoiditis, mastoid abscess and its complications; and commotion of the eighth cranial nerves (the cochlear branches always suffer, the vestibular branches less frequently), with (*a*) sudden onset, and (*b*) gradual onset. He attributes the increase of ear injuries among the soldiers of this war to the greater number of large guns and explosives, together with the longer exposure to rapid fire. Loud detonations rupture the ear-drums and cause hæmorrhage, ecchymoses and molecular disintegration of the ear apparatus. Less violent continued irritation causes a molecular change and nutritional impairment, resulting in dry inflammation. Deafness and vertigo are common effects of "commotion" and "shell-shock." Obstruction of the nares, pharynges, and Eustachian tubes increases the susceptibility of ears to damage, as also does absence of the middle ear apparatus and its impairment through loss of continuity, loss of substance and the presence of cicatrices. Nutritional disturbances, dry inflammation, otosclerosis, "dry catarrh," calcification, fibrosis, etc., render the ear mechanically more delicate and susceptible to injury, and interfere with repair of injuries. The excessive irritation of loud sounds is apt to cause a greater number of all the forms of dry otitis. Ruptured tympanic membranes under care usually healed in 5 to 21 days without suppuration. If suppuration occurs, the duration of the otitis is lengthened, but is considerably shorter than the course of middle-ear suppuration in civil practice, and averages about 12 days. In "commotion" or lesions of the eighth nerve, the prognosis is better in the acute cases, but complete restoration of function cannot be expected. Prolonged auditory rest, with general hygienic attention, is indicated. Cases of nerve lesions and commotion, with gradual onset, offer no hope of improvement with or without treatment.

### (170) Laryngectomy.

The use of local anæsthesia alone in laryngectomy is regarded by John Edmund MacKenty as brutal and unjustifiable (*Journ. Amer. Med. Assoc.*, September 15, 1917). He recommends a combination of local and general-local anæsthesia (2% novocain-suprarenin solution) for the skeletonization of the larynx and trachea, and closure of the wound, and general (ether) anæsthesia for removal of the larynx. Morphine is given one hour before the operation. For total laryngectomy the one-stage operation is advocated, because otherwise at the second stage the operation must be performed in a well-established septic field, and because primary union between skin and tracheal mucosa is seldom possible in mutilated and infected tissue. When the arytenoid on one side is involved, total extirpation of the larynx and removal of the neck tissues, if the disease extends to the posterior part of the arytenoid, is the safer procedure. If a block dissection of the neck is indicated, complete removal, *en masse*, of the sterno-mastoid with all the underlying glands and lymphatic-bearing tissues is advised, thereby saving time and giving a good exposure to the deep structures of the neck. The author's own technique for hemi- and total laryngectomy, as well as after-treatment, is fully detailed, and a report of 19 cases added.

# Obituary.

## ROBERT BYRON DUNCAN.

The medical profession and the public of Victoria have sustained a severe loss by the death of Robert Byron Duncan. Though he practised all his life in a country town, "Duncan of Kyneton" had a reputation all over Australia. He was born at Ayr, Scotland, on March 18, 1849, and, when very young, was brought to Australia by his parents, Mr. and Mrs. W. Duncan. His school education was given at the Scotch College, Melbourne, but he returned to Scotland for his medical studies, and took the diploma of Licentiate of the Faculty of Physicians and Surgeons of Glasgow, in 1877, having obtained the Licentiate of the Society of Apothecaries of London the previous year. He returned to Australia immediately he was qualified, and after practising for a year at Coleraine, settled in Kyneton, where he remained until his death, on April 17, 1918.

Robert Byron Duncan was appointed resident surgeon to the Kyneton Hospital in 1879, with the right of private practice, and retained that position until 1885, when he became Honorary Surgeon. He was also a member of the Committee of the Hospital, and its President in 1899. During the whole of his career he took the keenest interest in every detail of the management of the institution. He was an exceptionally sound and progressive surgeon, a skilful operator, a most industrious student of contemporary medical literature, and a voluminous contributor to congresses, medical societies and medical journals. In fact, hardly a year passed without something from his pen. His papers covered a wide range, and indicated his extensive knowledge and acute and careful observations. One of his first papers, published in 1880, was on a case of œsophageal stricture, for which he had most successfully performed gastrostomy. The operation at that time had not been very often performed, and its results were unfavourable, so that it required considerable courage and confidence for a young country practitioner to undertake it. A subject that early engaged Duncan's attention was the surgical treatment of fibro-myoma of the uterus. In February, 1883, he recorded a successful removal of a very large and adherent uterine fibroid, the pedicle having been treated extraperitoneally. He continued this plan of dealing with the pedicle for a long time, after nearly all abdominal surgeons had abandoned it in favour of the intraperitoneal method. He was loath to abandon a plan which had given him such good results, and which he thought was safer for a surgeon who did not have the opportunity of performing the operation very frequently. For the same reasons, he conservatively continued to treat abdominal hydatids by the Fitz-Gerald method—of producing parietal adhesions with hare-lip pins, when most surgeons had adopted Lindemann's operation. On the other hand, he was an early convert to the necessity of treating gall stones surgically. He published a paper on this subject in 1890, and in a subsequent communication, in 1896, he said: "As soon as it is evident that a patient is becoming the subject of cholelithiasis, operative measures should be considered without delay." Among other subjects dealt with by Duncan were the radical cure of hernia, thyroid adenoma, torticollis and pancreatitis. One of his latest contributions was a report of a very interesting case of bullet in the bronchus, which he successfully removed by a posterior mediastinal thoracotomy.

Although practising in the country, Robert Byron Duncan frequently came to Melbourne to attend the meetings of the Medical Society of Victoria and the Victorian Branch of the British Medical Association. He was a member of the Committee of the Medical Society, and President in 1898, when he delivered a thoughtful address on antiseptic and aseptic surgery.

He paid several visits to Europe for purposes of study, passing the examinations for the F.R.C.S. Edin., in 1886, and for the M.D. of Brussels, in 1892. He was often urged to settle in Melbourne, but preferred to remain in Kyneton, where he saw patients from all parts of Victoria, and where he was identified with its interests. He was a member of the Shire Council, and its President in 1904. He was frequently asked to represent the electorate in Parliament, but declined, as he felt his time was more valuably spent in professional work. In private life he was genial and kindly, with a commanding figure. He held very definite opinions on social and political subjects, which he could express ably and forcibly, but always courteously. He took a great interest in free-masonry, and for many years was Treasurer of the Kyneton Lodge. He was twice married, and had two sons and one daughter. His second son, Hugh Rennie Duncan, had a distinguished career as a student, and gave great promise of becoming an excellent surgeon, when he died, about three years ago. His loss was a great blow to his father, who never seemed quite the same afterwards, and soon followed his son to "that bourn from which no traveller returns." But his example remains illustrating that the secret of success is the possession of the "master word" as Osler calls it, work, and encouraging others on the same road.

## JAMES PATRICK RYAN.

In the year 1840 there was born in the county of Tipperary, Ireland, the third son of Patrick Ryan, a solicitor practising at Tralee. Patrick Ryan had previously changed his family name from O'Ryan to Ryan. His father had served in the British Army as Surgeon. Patrick Ryan held the lease of "Clounmore" during his lifetime. This was the only way in which Roman Catholics could hold land in Ireland in the nineteenth century. The lease was not renewed after his death in 1855. His family consisted of three sons and one daughter. The daughter married James Meldon, a well-known surgeon in Dublin. The sons all entered the medical profession. George entered the Royal Army Medical Corps and died in 1904. John, the second son, served in the Franco-Prussian war with his brother James Patrick.

James Patrick Ryan studied medicine at the Catholic University of Medicine in Dublin and obtained the diplomas of L.K.Q.C.P. Irel., and L.R.C.S.I., in 1865. In 1884 he obtained the membership of the College of Physicians. Between 1865 and 1870 he resided and practised in Panama, Peru and Chile. He then visited Paris and was there when war broke out. He served in the Army of the Loire as Ambulance Surgeon throughout the whole war, and received the decoration of *Chevalier de la Légion d'Honneur*. In 1873 he married Jane Tidmarsh, of Lota, Limerick. In the same year he left Europe to take up his abode in Melbourne. At first he chose to devote himself to general practice, and rapidly became extremely popular. His practice was a large and valuable one, and he was greatly beloved by all his patients. Later he substituted eye and ear work for general medicine, and when he moved to Collins Street, he concentrated his attention exclusively to this combined specialty. From 1875 to 1887 he acted as Honorary Surgeon to out-patients at the Melbourne Hospital. In 1876 he was appointed Honorary Assistant Surgeon to the Victorian Eye and Ear Hospital, a position which he retained for thirteen years. In 1887 he relinquished his duties in the Out-patient Department at the Melbourne Hospital, and allowed himself to be elected Honorary Surgeon for Diseases of the Skin. This position he held for two years. In January, 1889, he resigned from the Hospital. In the same year he became full Honorary Surgeon at the Victorian Eye and Ear Hospital, and in 1908 he attained the office of Senior Honorary Surgeon. In 1913 he joined the Consulting Staff, and at the time of his death he had a record of 42 years of service at this splendid institution. He was chosen to be a member of the Hospital Committee in 1897, and his counsel was highly valued by all connected with the Hospital. In the year 1915 the National University of Ireland conferred on him the degree of *Doctor Medicinae, honoris causa*.- He was formerly a member of the permanent forces in the Commonwealth, with a commission in the Army Medical Corps. He retired with the rank of Major.

From the year 1874 he gave of his best to the Sisters at the Abbotsford Convent, and when he relinquished his position of medical attendant some 38 years later, the Sisters of the Good Shepherd realized that they were losing a staunch friend, a devoted medical adviser and a wise counsellor. His interest in the Convent and in the branch institutions at Oakleigh and South Melbourne was maintained until the end.

Of his ability as an ophthalmic and aural surgeon little need be said. His skill, keen judgement and knowledge were universally recognized. He was the beau ideal Irish gentleman, gentle, suave, tactful and always courteous. The record of his life as a fine example of a long life spent to the advantage of mankind. His chief hobby was horses, and his affection for his dumb friends was well known. On numerous occasions his knowledge was utilized at the Royal Agricultural Show as a judge for thoroughbreds and hackneys. His seat on horseback was quite characteristic, and it was a common experience to meet him in riding costume in Collins Street. On his return from a visit to the homeland recently, he brought with him a very fine highly-bred Arab stallion from the most celebrated stud in Algiers.

His death was sudden. He had not complained of ill-health. On April 8, 1918, his wife, who had been ill for some days, was taken to a private hospital. He attended to his work during the day, but the worry and anxiety did their part rapidly. He died on the same day.

## Correspondence.

### THE DOSAGE OF QUININE FOR MALARIA.

Sir,—In more than one issue of the *Journal* lately I have noted in your leading articles the statement: "Quinine does not kill the plasmodium unless in a concentration of 1 in 5,000 and half gramme doses three or four times a day will never produce this concentration." (See *The Medical Journal of Australia*, January 19, 1918).

I infer you advocate larger doses. Practising in a malaria district one naturally sees a good deal of malaria, in fact one has to have it in view with practically every patient under one's care, and my experience is that a very much smaller dose is effective if properly administered.

A representative of the Rockefeller Institute visited Samarai last year, and whilst in Samarai discussing the subject with him he stated that an eminent medical scientist connected with one of the American Institutes had lately gone exhaustively into the question of the dosage of quinine.

The first question he considered was "How long does a dose of quinine remain effective in the system?" This question must be settled to avoid acting entirely on the blind. As regards the periods at which a dose must be repeated, it is evidently of primary importance to maintain a continuous effect, not an intermittent one, and after an exhaustive enquiry, including the rate of secretion, the conclusion was that the effectiveness of a dose only lasts for a period of two hours.

The next question was "What is the minimum effective dose of quinine?" and this was given as two grains.

Now I have had a fair number of patients during the past six months that I have treated on these lines, and certainly all severe cases have been so treated, that is to say, two grains every two hours, and if severity demands it, every two hours of the twenty-four, and without exception the results have been most satisfactory; in fact as far as immediate improvement is concerned in the course of the disease, I have never experienced such satisfactory results from the medical treatment of any other disease.

Just to outline a case as an example, a patient had been suffering with a severe attack for about a week, the spleen was close to iliac crest, the temperature 105.6° and twelve hours later 105°. The patient was then put on to 2 grs. every two hours. Prior to this she had been taking larger doses at longer intervals. Twenty-four hours later the temperature was normal and never again rose above 99°, and in three weeks the spleen had retracted to the lower border of the ribs.

Again a patient was brought in from an outlying plantation who had suddenly lost his sight, had an acute attack of malaria and developed black water, was placed on 1 gr. tentatively and then on 2 grs. every two hours with the happiest of results—and such has been my experience in a considerable number of cases.

It might be argued that it was not the two grains that were effective but the accumulation of a much larger quantity in the system. Well, my experience tends to show that this is not the case.

Several of my patients have been taking more quinine in twenty-four hours prior to starting the two-hourly dose, in two of these large doses, with very little effect, and have responded to the continuous dosage.

Quinine in large doses causes considerable distress and unpleasantness, but apart from unpleasantness, I am strongly of opinion that it is undesirable to give unnecessarily large doses. Two grains produces very little after-effect, the only trouble I find is that patients, directly they feel better, will not continue the two-hourly dosage.

I can give no indication as to how long this line of treatment is necessary in order to produce a radical cure.

My experience is that vomiting is a very prevalent symptom in severe malaria, and that 1 grain of *sodae brom.* with each 2 grs. dose of quinine is very effective, and it is often necessary to give it in capsules till the vomiting subsides.

I thus feel confident that one of the essential points in treatment is continuity of effect. I have given my experience chiefly with a desire to obtain the opinions of others who have given this method an efficient trial, and this I would define as 2 or 2½ grains of a readily absorbable preparation, preferably the bihydrochlorate, and in severe cases every two hours of the twenty-four.

Yours, etc.,
W. T. HARSE, M.D.

Samarai, Papua,
April 5, 1918.

[Dr. Harse claims that he obtains good clinical results from the exhibition of 0.12 gramme of quinine in malaria. In the article to which he refers the contention was made, not that small doses of quinine or any other drug that stimulates the hæmapoietic organs, do not act beneficially, but that the dose necessary to kill the malarial plasmodium must be sufficient to produce a concentration in the blood of 1 in 5,000. An average man has three litres of blood in his body, and consequently, if an attempt be made to remove the causal organism of malaria, the dose given must be at least 0.6 gramme. Dr. Harse adduces no evidence that his repeated small doses had any effect at all on the parasite.]

### IONIC MEDICATION.

Sir,—Our attention has been drawn to your issue of the 27th ultimo, in which an account is given of the joint meeting of the British Medical Association (N.S.W.) and the Electrical Association of Australia (N.S.W.), held on the 12th idem, at the B.M.A. rooms. We have carefully read the condensed report of the proceedings and your leading article on the subject of "Ionic Medication." As many inaccuracies have crept in the former, and as we have reason to disagree with many of the expressions of opinion in the latter, we would be glad if you will publish the following:—

As regards the paper dealing with "Some practical points in ionic medication," we would refer your readers to the actual printed paper on the subject, when the inaccuracies mentioned will be apparent. This printed paper was issued prior to the meeting by the Electrical Association, and it is regretted, therefore, that our opinions, expressed therein, were not printed in your issue in the same form as we gave them. We gave most careful consideration to each sentence of the paper, which was itself a condensed account of a great number of obervations and experiments, and it was only due to lack of time at the meeting that we were regretfully forced to merely give a demonstration of the effects and apparatus connected with the subject. We most particularly refrained, both at the meeting and in the paper, from dealing with actual clinical practice in cases which we have witnessed, except where we illustrated the immediate value of any particular experiment. To have introduced such a matter would obviously have led to an interminable and profitless discussion, which, even as it happened at the meeting, had a leaning in that direction.

Our main object was to show that there is sufficient background of scientific fact in the practice of ionic medication to warrant medical and dental practitioners paying

attention to the subject as an aid to their practice, rather than as food for cynical disbelief.

Dealing with your leading article, many of the statements made by the writer are at variance with the facts. Taking them seriatim:

It is suggested that Lewis Jones was the first to notice certain effects due to the passage of direct current through external electrolytes and human tissue—that is not so. Lewis Jones was merely a disciple of Professor Le Duc, of Nantes University, whose masterly series of original papers on the subject have led to a considerable development of this branch of electro-therapeutics, in many countries. Lewis Jones was, perhaps, the leading man in England on the subject, and his well-known works, containing a little of the theory of ionic migration, have been accepted, apparently, as text-books by those interested.

It is stated, as an example of the ineffectiveness of ionic medication in deep-seated lesions, that, with the current "ordinarily employed," the quantity of iodine which can be moved across a boundary in 20 minutes is 8 mgrs. That figure presupposes that a current of 10 milliampères only is used; but in actual practice a figure as low as 10 m.a.'s would rarely be used. Generally from 40 to 50 m.a.'s, and on occasions up to 150 to 200 m.a.'s, are used in such cases, for periods varying from 20 minutes up to 60 minutes, or more. Moreover, the treatment is repeated when required; so that, whilst we do not subscribe to the view that the great relief from pain, which is immediately felt after ionic treatment, is entirely due to the ion which is forced into the tissues from an external electrolyte, we have considerable clinical evidence that some physiological effect is due to the introduction of the ion. We gave a theoretical reason in our paper, based upon experimental data, for the main observed effects. We did not, as appears to be assumed in your article, neglect the possibility of the partial dissipation into the system of the ions due to blood and lymph flow—the former being the chief agent in effecting this. After all, it is not definitely established that an iodine mixture, taken by mouth, is going to give any better results, or any superior concentration, at the site of the lesion, than that forced into the tissue immediately in its vicinity, allowing even for the dissipation above mentioned. It appears to us equally useless for dogmatic utterance to be given on either side of the question, without definite data to go upon.

But when we come to lesions at or near the surface, that phase of the problem is simplified. Your article somewhat humorously states that Mr. Myers referred to Turrell as "the major opponent" of ionic medication for infected surface wounds. We certainly mentioned, incidentally, some practical conclusions reached by "Major" Turrell, R.A.M.C., in an apparently unbiassed paper on that and other kindred matters, and as our observations have entirely coincided with those of Major Turrell, we felt that a certain amount of weight might well be attached to the quotation which we gave. Following on that observation, your article seeks to convey the very extraordinary suggestion that mere mechanical swabbing of a sinuous wound with a dilute solution of NaCl will bring chlorine ions into contact with every part of the surface of the wound, and states, further, that "the effect will be rapid." May we ask "what effect?" If it is suggested (assuming it were possible to mechanically reach each portion of the surface, as your article indicates), that suppuration would thereby be eliminated and a cure effected, we feel that the method might well be brought to the notice of the medical world, which at present, as far as we can ascertain, is ignorant of the practice.

But let us take a simpler and quite common case—a chronic, or indolent, ulcer. Let us place over the ulcer (as we have done) a glass cylinder containing a dilute solution of, say, zinc sulphate. Let us in this manner bring the solution into close mechanical contact with the exposed surface of the ulcer. Now let us try suggestion, or mechanical pressure with a sterile swab, or incantations, or (as one medical man so delicately put it at the meeting) the putting of a piece of potato in one's pocket, and watch the effect. We get, as we deserve to get, no progress towards a cure. Now let us place a rod of zinc or carbon in the electrolyte within the cylinder, connect the positive pole of the electrical source of supply to the zinc or carbon, and the negative pole to another part of the body, taking suitable precautions to regulate the rate of current flow. Within a second or two the whole surface of the ulcer is changed in colour and in general appearance. Within a few minutes the treatment is complete, and in the majority of cases a healing edge is evident on the following day; within a week or two the ulcer is cured. We ask the writer of the article "Is, or is not, this procedure a useful pharmacological one?"

We feel that if your article had omitted the whole of the last sentence, and the first clause of the last sentence but one, its author would be less liable to be subject to future self-condemnation.

Yours, etc.,

W. H. MYERS.

R. GRANT.

Sydney May 3, 1918.

[(*i.*) Mr Myers did not read the article which is to appear in the proceedings of the New South Wales Section of the Electrical Association of Australia, but gave an excellent demonstration with the aid of the balopticon. The résumé of his remarks, published in our issue of April 27, 1918 (pp. 358-359), does not purport to be an abstract of his printed paper, but a summarized record of what he said.

(*ii.*) We regret that the name of Le Duc was omitted, as the pioneer. The majority of British medical practitioners associate the name of Lewis Jones with ionic medication, probably because he was the earliest and most ardent advocate of this method in the Empire. We trust that we may be pardoned for having referred to the disciple instead of to the master.

(*iii.*) Professor Vonwiller gave to the meeting a definite quantitative statement. The reference to 10 milliampères was justified, because the majority of the advocates of ionic medication have used currents of this strength in practice. Messrs. Myers and Grant now propose to increase the current to 150 or even 200 milliampères. We cannot accept clinical evidence as evidence that an ion is driven across numberless boundaries of solutions of electrolytes. In ordinary solutions the rate of deposition will depend *inter alia* on the area of the electrode and on the quantity of the current. The larger the electrical field, the less will be the amount of deposition per unit of area. By increasing the amount of current and simultaneously increasing the area of the electrodes to a proportionate degree, the density of the current will remain unchanged. In these circumstances the number of ions carried to a given position in the tissues would not be altered. Whether there is any practical gain in increasing the current from ten to two hundred milliampères, when the size of the electrodes have to be increased, is a matter which is open to doubt. There is at present no information concerning how much iodine or salicylic acid can be directed to a given point at a measurable distance below the surface of the body under any set of standard conditions. In view of the theoretical information available, it appears that the passage of ions through five or ten centimetres of living animal tissue is so slow, and the amount that can be directed to a given point with currents which are not directly harmful, is so minute that we feel justified in doubting whether a pharmacological dose can be applied in this manner. On the other hand, we have definite quantitative data concerning the amount of iodine, for example, which is present in the blood after the internal administration of an iodide, and we have also accurate analyses of the amount of iodine found in the tissues after oral or intravenous application. Messrs. Myers and Grant are probably unaware of these facts, otherwise they would not speak of the uselessness of dogmatic utterances. If they can adduce evidence that by ionic medication the thyroid gland can be forced to take up between 5 and 6 mgrs. of iodine per gramme of dried substance, we should have for the first time evidence that this method is as efficacious as that of giving iodides by the mouth. It has been shown experimentally that the saturation of thyroid tissue with iodine lies at this level, and further, that 18.5% of the iodine given by mouth can be discovered in the thyroid gland. Similar experimental work has been carried out by competent observers in connexion with the affinity for iodine of inflammatory fibrous tissue in other parts of the body.

(*iv.*) Messrs. Myers and Grant ask "what effect" is referred to in the statement dealing with the application of dilute solutions of sodium chloride to a surface wound.

The practice of applying sodium hypochlorite solutions to wounds is based on the fact that chlorine is liberated from these solutions, and that free chlorine does exercise some pharmacological action on inflamed tissues and bacteria. The experiment with the glass cylinder and the indolent ulcer is particularly unconvincing. Assuming that the positive electrode is placed at some distance from the surface of the ulcer, and that the process of electro-plating goes on, it follows that, just as was demonstrated most admirably by Messrs. Myers and Grant, an area of acidity, sufficient to produce an intense reddening of litmus, will appear in the neighbourhood of the zinc or carbon electrode, and an area of alkalinity will appear at the opposite side of the solution of electrolyte. In this case the surface will act practically as the electrode. Mr. Myers did not inform the meeting what the degree of acidity and alkalinity was under the conditions of his experiments, but this could readily be measured by a chemist. If a solution of sodium hydrate of the same alkalinity were first applied to the surface of the indolent ulcer, the change in appearance would be just as remarkable as that observed in the cylinder.

(*v.*) We have no objection to admitting that the opinions expressed in these columns have been incorrect or erroneous, if it can be shown that they are. Our object is to arrive at the truth, and we still look to Messrs. Myers and Grant to supply acceptable evidence of the power of an electric current to direct a phamacological dose of iodine or other chemical substance to a lesion placed a measurable distance below the skin surface.]

## JONES v. LE COUTEUR.

Sir,—Dr. Frank Andrew is quite under a misapprehension when he states: "I decline absolutely to enter into a controversy with him." He has not been invited by me to do so. He has, however, opened[1] up a correspondence in the columns of *The Medical Journal of Australia*, a scientific journal, representing the profession throughout Australia, and his discussion has very properly taken place with you.

The defendant in this case procured the services of Drs. Frank Andrew, J. Newman Morris and Wm. M. Clayton, with the sole object of discountenancing evidence given by me. Dr. Frank Andrew made certain statements upon oath which I maintain were not founded on facts. The statements were made in a public court, and subsequently appeared in the public press. Now he suggests to you that he should be given an opportunity to make good his statements *in camera*. I need only inform you that I prefer the open field. If Dr. Andrew has nothing to fear, the foundation upon which he stands can be made perfectly secure by his being able to maintain the stand he has taken; my position, on the other hand, being that if he is successful in doing so, I must stand down and tender him an ample apology. This I am prepared to do, but am not in the least disturbed as to the prospects of my having to do so.

Drs. J. Newman Morris and Wm. M. Clayton have chosen the wiser of two courses, *viz.*, silence.

My explanation of the delay in dealing with this matter is that I have not had time at my disposal to do so at an earlier date.

Yours, etc.,
RICHARD JONES.

110 Collins Street, Melbourne,
May 1, 1918.

# Special Correspondence.

(By Our Special Correspondent.)

## LONDON LETTER.

### Transfer of Medical Students from the Colours to the Reserve.

Provisions for the transfer of certain classes of medical students serving with the colours to the Reserve, or for discharge if ineligible for transfer, are contained in Army Council Instruction No. 153, issued towards the middle of February.

It provides that:—

A medical student now serving with the colours who (*a*) is a third year medical student, and was at the time of his enlistment actively engaged in medical studies; or (*b*) at the time of his enlistment had passed the whole of the professional examination in chemistry, physics, and biology (or botany and zoology) for a medical degree or licence, and was at the time of his enlistment actively engaged in medical studies, is, if eligible, and he so desires, to be transferred (regardless of his medical category) to Class W., or W. (T) of the Reserve, or discharged if ineligible for transfer to the Reserve, for the purpose of resuming his studies with a view to obtaining a medical qualification.

For the purpose of this instruction, a man who had on, or before, enlistment completed two years of medical study, and who can within 36 months complete his professional curriculum, and obtain his medical degree or licence, is to be regarded as a third year medical student.

G.O's. C.-in-C. Expeditionary Forces, G.O's. C.-in-C., and G.O's. C. stations abroad and commands at home will be the approving authority for release of medical students under the instruction except where the student is holding a commission. In such cases a statement of his case, with the prescribed certificates, is to be forwarded by the G.O.C.-in-C. of the Expeditionary Force or the G.O.C.-in-C., or G.O.C. of the station abroad or of the command at home for the consideration and decision of the Army Council.

### The General Medical Council.

The one hundred and sixth Session of the General Medical Council was inaugurated at the Offices of the Council in Hallam Street on November 27, 1917, when the President, Sir Donald MacAlister, occupied the chair.

Two new members took their seats for the first time: Mr. Meredith Townsend, M.R.C.S., as representative of the Society of Apothecaries, and Colonel Gilbert Barling, F.R.C.S., as representative of Birmingham University.

In the course of his opening address the President said that conditions created by the war were pressing upon all departments of medical organization, straining to its limit the old machinery, and compelling the construction of new and temporary devices. The withdrawal of students from the medical schools for combatant service threatened to deprive the country of the necessary quota of new practitioners in the coming two years, but the Ministry of National Service had declared its intention to provide, if possible, that the supply of students in training should be maintained at a level sufficient to ensure the annual accession of at least 1,000 new medical practitioners to the Register. The claims of the Army for fresh drafts from the civilian members of the medical profession continued, though it had become a serious problem how those claims were to be met. A War Office Committee, which included members of the Medical Council, had visited the western front during the summer, for the purpose of discovering what economies in personnel could be made in the Medical Corps. Its report was not yet issued, but it was questionable whether any practicable economy could be commensurate with the continuous wastage due to the incidents of warfare. The devotion and success of the Medical Corps in preserving and restoring the health of our troops had been recognized in the highest terms by the highest authorities, but the service was rendered at a heavy cost in sacrifice. The average number of names annual removed from the Register by death had risen from 620 to 983 in 1916, and in the current year it would probably be not less than the latter figure. The welcome co-operation of the United States of America in sending over medical units in advance of its troops had afforded the Allies some relief in this respect. The shortage of medical men had tempted unqualified persons to personate qualified practitioners, and to assume their titles. The Registrar would be ready to enquire carefully into every case brought to his notice, where such a suspicion existed. In regard to cases calling for judicial enquiry there was much irregularity of medical certification, but instructions had been issued to all officials and members of National Service Medical Boards duly to consider and file for presentation every certificate presented by a man from his private medical attendant.

A proposal to secure the election of the representatives of registered dentists upon the General Medical Council was

[1] Dr. Jones is in error. Dr. Andrews repled to a letter written by Dr. Jones; the latter "opened" the correspondence.

discussed, and it was eventually resolved: "That it would be an advantage to the Council in administering the Dentists Act if provision were made for the appointment to the Council of members of the dental profession."

The time of the Council during the rest of its session was devoted to the hearing of disciplinary cases and the reception and adoption of reports from the various committees.

## Books Received.

MANUAL OF MEDICINE, by T. K. Monro, M.A., M.D., Fourth Edition, University Series; 1917. London: Baillière, Tindall & Cox. Demy 8vo., pp. 1045, with 48 figures in the text. Price, 18s.

HANDBOOK OF OPERATIVE SURGERY, by William Ireland de C. Wheeler, with an Introduction by Surgeon-General Sir Alfred Keogh, G.C.B., Third Edition; 1918. London: Baillière, Tindall & Cox. Crown 8vo., pp. 364, with 226 Illustrations. Price, 10s. 6d.

## Medical Appointments.

The appointment of Dr. J. B. McLean (B.M.A.) as Medical Superintendent of the Brisbane Hospital has been announced in the *Queensland Government Gazette* of April 27, 1918.

Dr. Harry C. Phippen has been appointed Medical Officer of Health for the Quambatock district of Kerang Shire, Victoria.

Dr. W. A. T. Lind (B.M.A.) has been appointed acting Medical Superintendent of the Hospital for the Insane, Mont Park, Victoria.

Dr. H. Pern (B.M.A.) has been appointed a Certifying Medical Practitioner for the Leongatha centre, Dr. J. H. Rutter (B.M.A.) has been appointed a Certifying Medical Practitioner for the Yarram centre, and Dr. L. S. Kidd (B.M.A.) has been appointed a Medical Referee for the Castlemaine centre, under the provisions of the *Workers' Compensation Act, 1915* (Victoria).

## Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," page xv.

Royal Alexandra Hospital for Children, Camperdown, Resident Medical Officer and temporary Honorary Relieving Medical Officer.

Coast Hospital, N.S.W., Junior Medical Officers (2).

Rookwood State Hospital and Asylum, N.S.W., Medical Officer.

Women's Hospital, Sydney, Resident Medical Officer.

## Medical Appointments.

### IMPORTANT NOTICE.

**Medical practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429 Strand, London, W.C.**

| Branch. | APPOINTMENTS. |
|---|---|
| VICTORIA.<br>(Hon. Sec., Medical Society Hall, East Melbourne.) | All Friendly Society Lodges, Institutes, Medical Dispensaries and other contract practice.<br>Australian Prudential Association Proprietary, Limited.<br>National Provident Association.<br>Life Insurance Company of Australia, Limited.<br>Mutual National Provident Club. |
| QUEENSLAND.<br>(Hon. Sec., B.M.A. Building, Adelaide Street, Brisbane.) | Medical Officers to the Selwyn Hospital, North Queensland.<br>Brisbane United Friendly Society Institute<br>Cloncurry Hospital. |
| SOUTH AUSTRALIA.<br>(Hon. Sec., 3 North Terrace, Adelaide.) | The F.S. Medical Assoc., Incorp., Adelaide.<br>Contract Practice, Appointments at Renmark. |
| WESTERN AUSTRALIA.<br>(Hon. Sec., Health Department, Perth.) | All Contract Practice Appointments in Western Australia. |
| NEW SOUTH WALES.<br>(Hon. Sec., 30-34 Elizabeth Street, Sydney.) | Australian Natives' Association.<br>Balmain United F.S. Dispensary.<br>Canterbury United F.S. Dispensary.<br>Leichhardt and Petersham Dispensary.<br>M.U. Oddfellows' Med. Inst., Elizabeth Street, Sydney.<br>Marrickville United F.S. Dispensary.<br>N.S.W. Ambulance and Transport Brigade.<br>North Sydney United F.S.<br>People's Prudential Benefit Society.<br>Phœnix Mutual Provident Society.<br>F.S. Lodges at Casino.<br>F.S. Lodges at Lithgow.<br>F.S. Lodges at Parramatta, Auburn and Lidcombe.<br>Newcastle Collieries — Killingworth, Seaham Nos. 1 and 2, West Wallsend. |
| TASMANIA.<br>(Hon. Sec., Macquarie Street, Hobart.) | Medical Officers in all State-aided Hospitals in Tasmania. |
| NEW ZEALAND: WELLINGTON DIVISION.<br>(Hon. Sec., Wellington.) | Friendly Society Lodges, Wellington, N.Z. |

## Diary for the Month.

May 14.—Tas. Branch, B.M.A., Council and Branch.
May 14.—N.S.W. Branch, B.M.A., Ethics Committee.
May 15.—W. Aust. Branch, B.M.A.
May 16.—Vic. Branch B.M.A. Council Election of Representatives on Representative Body.
May 16.—Vic. Branch, B.M.A., Council; election of Representative on Representative Body.
May 21.—N.S.W. Branch, B.M.A., Executive and Finance Committee.
May 24.—Q. Branch, B.M.A., Council.
May 28.—N.S.W. Branch, B.M.A., Medical Politics Committee; Organization and Science Committee.
May 30.—Vic. Branch, B.M.A., Council.
May 31.—N.S.W. Branch, B.M.A.
June 5.—Vic. Branch, B.M.A.
June 7.—Q Branch, B.M.A.
June 11.—Tas. Branch, B.M.A., Council and Branch.
June 11.—N.S.W. Branch, B.M.A., Ethics Committee.

### EDITORIAL NOTICES.

Manuscripts forwarded to the office of this Journal cannot under any circumstances be returned.

Original articles forwarded for publication are understood to be offered to *The Medical Journal of Australia* alone, unless the contrary be stated.

All communications should be addressed to "The Editor," *The Medical Journal of Australia*, B.M.A. Building, 30-34 Elizabeth Street, Sydney, New South Wales.